GASTROENTEROLOGY

ABSTRACTS AND CITATIONS

NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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CONTENTS

	Abstracts, Citations	Page
PRE-CLINICAL SCIENCES		
Morphology, Cellular Structure and Histochemistry	5844-5854	755
Absorption—Excretion—Transport	5855-5870	756
Motility	5871-5888	759
Secretion and Metabolism	5889-5895	763
Stomach	5896-5931	764
Pancreas	5932-5947	769
Hepatobiliary Tract	5948-6005	773
Intestine	6006-6039	782
General	6040-6055	787
DIAGNOSTIC PROCEDURES	6056-6095	790
GASTROINTESTINAL DISEASES		
Esophagus	6096-6133	795
Stomach	6134-6198	797
Peptic Ulcers	6199-6218	803
Small Intestine	6219-6247	806
Malabsorption	6248-6256	809
Large Intestine	6257-6311	811
Ulcerative Colitis	6312-6323	815
Pancreas	6324-6332	817
Pancreatitis	6333-6350	819
Liver and Biliary Tract	6351-6414	822
Hyperbilirubinemic States	6415-6416	830
Nonviral Hepatitis and Hepatic Injury	6417-6424	830
Acute Viral Hepatitis	6425-6439	832
Chronic Hepatitis	6440-6446	835
Alcoholic Liver Disease	6447-6458	837
Cirrhosis	6459-6468	840
Gallbladder and Biliary Tract Diseases	6469-6498	843
General	6499-6547	848
Parasitology	6548-6555	852
Regional Enteritis	6556-6567	853
AUTHOR INDEX		
SUBJECT INDEX		

The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1981.

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NOTE

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	ml, µl	milli-, microliter(s)
ADP	adenosine diphosphate	mm	millimeter(s)
AMP	adenosine monophosphate	mOsm	milliosmolar; milliosmeter(s)
amp	ampere	msec	millisecond(s)
ATP	adenosine triphosphate	mV	millivolt(s)
A	angstrom	min	minute(s)
BSP	sulfobromophthalein	MTD	maximum tolerated dose
C	degrees centigrade	NAD	nicotinamide adenine dinucleotide
cal	calories	NADH	reduced nicotinamide adenine dinucleotide
cc	cubic centimeter		
cm	centimeter(s)	NADP	nicotinamide adenine dinucleotidephosphate
dl	deciliter		
DNA	deoxyribonucleic acid	NADPH	reduced nicotinamide adenine dinucleotidephosphate
ED_{50}	median effective dose(s)		
EDTA	ethylenediamine tetraacetic acid	ng	nanogram (10^{-9})
e.g.	for example	nm	nanometer(s)
EEG	electroencephalogram	Pa	ambient pressure
ESR	erythrocyte sedimentation rate	PAS	periodic acid - Schiff
g	gram(s)	pg	picogram (10^{-12})
µg	microgram(s)	pgEq	picogram equivalent(s)
Hz	Hertz	p.o.	orally
hr	hour(s)	ppb	parts per billion
Ig	immunoglobulin(s)	ppm	parts per million
i.m.	intramuscular	r	Roentgen
i.p.	intraperitoneal	RBC	red blood cells (erythrocytes), red blood count
IU	international unit(s)		
i.v.	intravenous	resp.	respectively
kcal	kilocalorie(s)	RNA	ribonucleic acid
kg	kilogram(s)	s.c.	subcutaneous
K_m	Michaelis constant	sec	second(s)
LD_{50}	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase		
m	meter(s)	SGPT	serum glutamic-pyruvic transaminase
M	molar; mole(s)		
mM	millimolar; millimole(s)	U	unit(s)
µM	micromolar; micromole(s)	UV	ultraviolet
ma	milliampere(s)	V	volt
mCi, µCi	milli-, microcurie(s)	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mg	milligram(s)	yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

5844 ON THE TOPOGRAPHIC RELATIONSHIP BETWEEN THE DISTAL BRANCH OF LATARJET'S NERVE AND PROXIMAL DELIMITATION OF THE GASTRIC ANTRUM. (Eng.) Brizzi, E.; Serantoni, C.; Ciani, P. A.; Fulignati, A.; Marinelli, R. (Universita di Firenze, Cattedra di Anatomia umana normale, Firenze, Italy). *Chir. Gastroenterol.* 11(3):297-298; 1977.

Histological investigations were carried out in 30 human stomachs to identify the boundary between the pyloric mucosa and that of the body and the fundus. This boundary was found to be situated on the lesser curvature, corresponding to the distal branch of Latarjet-Mitchell's nerve. Preoperative pH measurements confirmed these findings. In 20 stomachs, it was demonstrated that, on the lesser curvature, the mucosal boundary lies on a muscular ring formed by oblique fibers of gastric antral muscular membrane. The dissection of the distal branch of Latarjet-Mitchell's nerve showed the topographic relationship between this branch and the muscular ring. It is concluded that the distal branch of Latarjet-Mitchell's nerve topographically indicates the proximal delimitation of the gastric antrum.

5845 A SCANNING ELECTRON MICROSCOPIC STUDY OF NORMAL HUMAN OXYNTIC MUCOSA USING BLUNT DISSECTION AND FREEZE FRACTURE. (Eng.) MacKercher, P. A.; Ivey, K. J.; Baskin, W. N.; Krause, W. J. (Harry S Truman Memorial Veterans Hosp., Columbia, MO). *Am. J. Dig. Dis.* 23(5):449-459; 1978.

To study the three-dimensional structure of the human gastric mucosa, biopsies from the fundic mucosa of healthy volunteers were examined by scanning electron microscopy following blunt dissection and freeze fracture. The mucosal surface exhibited a cobblestone appearance. With increased magnification, microvilli were demonstrated on the luminal surface of individual surface cells. Blunt dissection of the gastric mucosa revealed tubular gastric pits descending from the surface until they opened into branched tubular gastric glands. The gastric glands were irregular in outline due to the knoblike projections of individual parietal cells. The internal structure of the component cells also was examined with the scanning electron microscope following freeze fracture. Mucous granules were observed in the apical portion of surface epithelial cells. Lumina of parietal cell canaliculi were found to be continuous with the lumen of the gastric glands. Pepsinogen granules were seen throughout the chief cell cytoplasm. The blunt dissection-freeze fracture technique utilizing the scanning electron microscope allows, for the first time, a three-dimensional view of human gastric mucosa, including the gastric pits and glands as well as some of the internal architecture of component cells.

5846 IMMUNOHISTOCHEMICAL IDENTIFICATION AND LOCALIZATION OF PANCREATIC POLYPEPTIDE CELLS IN THE PANCREAS AND GASTROINTESTINAL TRACT OF THE HUMAN FETUS AND ADULT MAN. (Eng.) Paulin, C.; Dubois, P. M. (Laboratoire d'Histologie et Embryologie, U.E.R. Medicale Lyon-Sud, B.P. n 12, 69600 Oullins, France). *Cell Tissue Res.* 188(2):251:257; 1978.

The evolution of pancreatic polypeptide (PP)-containing cells was studied in tissue from 5- to 24-week-old human fetuses, deceased premature infants, and normal adults. These cells were detected by using anti-bovine PP (BPP) serum in the pancreas and gastrointestinal tract specimens of the fetuses and premature infants and in biopsy-obtained specimens of the pancreas, antrum, and jejunum of adults with normal gastroduodenal endoscopy. Cell localization was established by studying the distribution of PP cells in comparison to the distribution of glucagon-, somatostatin-, and insulin-secreting cells. The first PP cells were seen in the pancreas at 10 weeks of gestation. They were located preferentially in the lower part of the head of the pancreas. The specificity of immunocytological reaction was ascertained by the inhibition of the reaction by preincubating the anti-BPP with BPP. Preincubation with somatostatin, gastrin, cholecystokinin, glucagon, or insulin did not modify the immunocytological reaction. Both the increased plasma levels of human PP and hyperplasia of PP cells previously reported in juvenile diabetes suggest a relation of PP to the physiopathology of diabetes.

5847 INTRAHEPATIC DISTRIBUTION OF NERVES IN THE RAT. (Eng.) Reilly, F. D.; McCuskey, P. A.; McCuskey, R. S. (Coll. Medicine, Univ. Cincinnati, Cincinnati, OH 45267). *Anat. Rec.* 191(1): 55-67; 1978.

As a result of the limited number of studies and lack of agreement on the intrahepatic distribution of nerves in the rat, a neurohistochemical and electron microscopic study of these nerves was initiated as part of an investigation of the neural component of mechanisms that regulate blood flow through the hepatic microvascular system in this species. Innervation was restricted primarily to vessels in the portal space and hilus. Both adrenergic and cholinergic fibers were observed in the adventitia of hepatic arteries, and to a lesser extent adjacent to portal veins. Some of the cholinergic fibers, however, were not contiguous with the vasculature. Near the hilus, many of these fibers were associated with ganglia, while, peripherally, some coursed into the immediately adjacent parenchyma where end bulbs abutted on hepatocytes. Ultrastructurally, scattered small nerves, devoid of neurolemma, were found contiguous with the portal lamina of hepatocytes. Nerve

fibers deeper within the lobule were not seen, but numerous gap junctions were observed between contiguous hepatocytes. Central and sublobular hepatic veins lacked innervation, but adrenergic nerves were demonstrated in the walls of larger hepatic veins. Innervation of the biliary system was sparse. While nerves were interposed between vessels and bile ducts, such nerves tended to be associated more closely with the vasculature. Extreme care must be exercised in extrapolating results obtained from rodents, which have little hepatocellular innervation except by peripherally located cholinergic fibers, to primates, including humans, which have considerable innervation that is adrenergic rather than cholinergic.

5848 THE BIOCHEMICAL PHARMACOLOGY OF MUCUS. (Eng.) Parke, D. V.; Symons, A. M. (Dept. Biochemistry, Univ. Surrey, Guildford, Surrey, England). *Adv. Exp. Med. Biol.* 89:423-441; 1977.

5849 FUNCTIONAL ANATOMY OF MUCUS-SECRETING CELLS. (Eng.) Hafez, E. S. E. (Dept. Gynecology-Obstetrics, Wayne State Univ., 540 E. Canfield Ave., Detroit, MI 48201). *Adv. Exp. Med. Biol.* 89:19-38; 1977.

5850 CATALASE IN SALIVARY GLAND STRIATED AND EXCRETORY DUCT CELLS. II. ϕ BODY: AN ELLIPSOIDAL PEROXISOMAL ORGANELLE WITH CRYSTALLOID AXIAL PROJECTIONS. (Eng.) Hanker, J. S.; Silverman, M. S.; Romanovicz, D. K. (Dental Res. Center, Univ. North Carolina, Chapel Hill, NC 27514). *Histochem. J.* 9(6):729-744; 1977.

5851 COMPARATIVE ANATOMICAL STUDY OF THE CHOLEDOCHODUODENAL JUNCTION IN MAN, PIG, RABBIT AND RAT. (Eng.) Germain, M.; Martin, E.; Gremillet, C. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, June 8-9, 1976.* (Basel: S. Karger): 6-12; 1977.

5852 A HISTOLOGICAL STUDY OF THE SPHINCTER OF ODDI. (Eng.) Fernandez-Cruz, L.; Pera, C. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, June 8-9, 1976.* (Basel: S. Karger): 13-20; 1977.

5853 IS THE SPHINCTER OF ODDI A REALITY IN MAN? (Eng.) Floquet, J.; Laurent, J.; Plenat, F.; Watrin, B. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, June 8-9, 1976.* (Basel: S. Karger): 21-24; 1977.

5854 MORPHOLOGICAL STUDIES BY PER-OPERATIVE TRANSCYSTIC RADIOMANOMETRY. (Eng.) Soler, R. P. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, June 8-9, 1976.* (Basel: S. Karger): 25-29; 1977.

See also, 5873, 5884, 5896, 5919, 5935, 5936, 5950, 6011, 6015, 6034, 6052, 6123, 6180, 6185, 6224, 6398.

ABSORPTION - EXCRETION - TRANSPORT

5855 ALTERATIONS IN RAT JEJUNAL PERMEABILITY TO A MACROMOLECULAR TRACER DURING A HYPEROSMOTIC LOAD. (Eng.) Cooper, M.; Teichberg, S.; Lifshitz, F. (North Shore Univ. Hosp., 300 Community Drive, Manhasset, NY 11030). *Lab. Invest.* 38(4):447-454; 1978.

The effects of intraluminal hyperosmolality on the intestinal permeability of a macromolecular tracer, horseradish peroxidase, was assessed in rats by light and electron microscopic cytochemistry to examine the role of hyperosmolality in the breakdown of the intestinal macromolecular barrier in some pathological conditions or stress situations. After 60 min of an intraluminal hypertonic perfusion of 600 mOsm mannitol, horseradish peroxidase was demonstrable in the intercellular spaces between adjacent absorptive epithelial cells of jejunal villi, along the microvillar brush border, in numerous pinocytotic vesicles, in multivesicular bodies, as well as in large lysosomes. Horseradish peroxidase was frequently found extending from the luminal surface of the cell through the tight junctional region and into more basal portions of the intercellular space. In occasional cells, fragments of the interdigitating plasma membranes of two adjacent absorptive cells appeared to bud off into the cytoplasm of one cell. In contrast, after 60 min of isotonic perfusion, horseradish peroxidase was confined to the microvillar brush border, a few pinocytotic vesicles, and occasional multivesicular bodies. These experiments suggest that the passage

of macromolecules across the jejunal epithelium of adult rats is enhanced under conditions of luminal hyperosmotic stress. This enhancement may be due to an alteration in the functional integrity of the tight junctional macromolecular barrier or to an increased rate of pinocytosis.

5856 THE USE OF THIRY-VELLA LOOP OF JEJUNUM TO STUDY THE INTESTINAL ABSORPTION OF CALCIUM AND INORGANIC PHOSPHATE IN THE CONSCIOUS PIG. (Eng.) Fox, J.; Care, A. D.; Swaminathan, R. (Dept. Animal Physiology and Nutrition, Univ. Leeds, Leeds LS2 9JT, England). *Br. J. Nutr.* 39(3): 431-439; 1978.

Pigs prepared with Thiry-Vella jejunal loops were used to study intestinal calcium and inorganic phosphate absorption to investigate the mechanism of absorption. The loops were perfused daily for 6-8 hr with a nutrient solution, and absorption from the perfusate was measured. The technique employed minimized atrophy of the jejunal mucosa and enabled the measurement of hourly or daily changes in absorption rate of components of the luminal fluid. No differences were observed when polyethylene glycol (PEG, molecular weight 4,000), ^{14}C-PEG, or ^{51}Cr-EDTA were used as markers of net water movement. Increasing the concentration of Ca in the perfusate resulted in the demonstration of a two-component relationship between net absorption rate of Ca and intraluminal Ca concentration. An initial rapid absorption rate from 0 to 4 mM was found, and then a slower rate from approximately 5 mM upwards that did not saturate at the highest concentration tested (25 mM). Increasing the concentration of phosphate in the perfusion solution increased the net absorption of phosphate from that solution. Although a two-component system, similar to that for Ca, was not evident, net absorption of phosphate was not saturated at the highest concentration tested (50 mM). The absorption of Ca was unaffected by the presence of phosphate in the solution, but Ca (2-5 mM) enhanced phosphate absorption.

5857 THE INTESTINAL HANDLING OF CALCIUM BY THE RAT IN VIVO, AS AFFECTED BY CORTISOL. EFFECT OF DIETARY CALCIUM SUPPLEMENTS. (Eng.) Ferretti, J. L.; Bazan, J. L.; Alloatti, D.; Puche, R. C. (Facultad de Medicina, Universidad Nacional de Rosario, Santa Fe 3100, 2000 Rosario, Argentina). *Calcif. Tissue Res.* 25(1):1-6; 1978.

The effects of cortisol on intestinal management of calcium and on related changes on bone metabolism were studied in five groups of 12 rats each fed a standard diet (0.8% Ca) and receiving 2, 6, 16, 32, or 128 mg/kg/day of cortisol hemisuccinate, s.c. After 16 days, intestinal absorption and excretion of Ca were measured with the aid of ^{45}Ca. True Ca absorption increased as a function of dose up to 16 mg/kg/day and remained high with the larger doses. Endogenous fecal Ca excretion increased exponentially as a function of the dose from 16 mg/kg/day onwards. Therefore, a dual effect was observed: (a) an increase in true Ca absorption at low cortisol doses (which increased net Ca absorption) and (b) an increase in endogenous fecal Ca excretion at high doses (which reduced net Ca absorption). In no case was a depression of true Ca absorption observed. Growth rate and food conversion efficiency were depressed only with a cortisol dose of 128 mg/kg/day. The urinary excretion of hydroxyproline, pyrophosphate, and aminopolysaccharides decreased with low doses and increased above normal levels with the highest dose. When animals treated with 128 mg/kg/day of cortisol were fed Ca-enriched diets (2.0 or 3.0% Ca), net Ca absorption improved ($p<0.01$). Simultaneously, growth rate and food conversion efficiency approached normal values. In these experiments, net absorption of Ca was found to be inversely related to urinary excretion of hydroxyproline. The urinary rate of excretion of hydroxyproline is suggested as an indicator of the effect of a Ca supplement on cortisol affected connective tissue turnover.

5858 ION TRANSPORT BY RABBIT COLON: II. UNIDIRECTIONAL SODIUM INFLUX AND THE EFFECTS OF AMPHOTERICIN B AND AMILORIDE. (Eng.) Frizzell, R. A.; Turnheim, K. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *J. Membrane Biol.* 40(3):193-211; 1978.

To further examine the properties of Na and K transport in the rabbit colon, the unidirectional influx of Na from the mucosal solution into the epithelium was determined, and the effects of amiloride and amphotericin B on Na entry were evaluated. The unidirectional influx of Na from the mucosal solution into the epithelium of *in vitro* descending rabbit colon (J_{mc}^{Na}) determined under short-circuit conditions was found to be comprised of two components. One represents entry of Na into transporting epithelial cells and was abolished by amiloride (10^{-4} M), which also abolished Na absorption (J_{net}^{Na}). The other represented diffusional Na entry into paracellular pathways traversing the epithelium. In all instances, exposure of the mucosal surface to amphotericin B (15 µg/ml) increased tissue conductance and J_{net}^{Na} and elicited K secretion. Tissues showing a spontaneous short-circuit current (I_{sc}) of approximately 4 µEq/cm^2/hr did not respond to amphotericin B with increased I_{sc} and J_{net}^{Na}. However, in tissues characterized by a lower I_{sc} under control conditions, amphotericin B increased I_{sc} and J_{net}^{Na} to approximately 4 µEq/cm^2/hr. These findings suggest that amphotericin increases J_{net}^{Na} and elicits K secretion by disrupting the normal perm-selectivity of the mucosal membrane. Under these conditions the extrusion of Na from cell-to-serosal solution becomes the rate limiting step in transepithelial Na transport. Finally, a close correlation between J_{mc}^{Na} and J_{net}^{Na} was observed when the rate of Na absorption varied either spontaneously or experimentally with amiloride, suggesting that the backflux of Na from cell-to-mucosal solution is undetectably small.

5859 SODIUM TRANSPORT BY ISOLATED BULLFROG SMALL INTESTINE: EFFECT OF PROSTAGLANDIN

E_1. (Eng.) Gerencser, G. A.; Tyler, T.; Cassin, S. (Univ. Florida, Coll. Medicine, Gainesville, FL). *Biochim. Biophys. Acta* 509(1):159-169; 1978.

Prostaglandin E_1 (PGE_1, 446 μM) was added to the serosal and mucosal media of isolated short-circuited bullfrog small intestine to investigate the mechanism of its stimulatory action on sodium secretion in the small intestine. The addition of PGE_1 to the serosal medium elicited small increases in transmural potential difference (PD) and short-circuit current (SCC), while addition of PGE_1 to the mucosal medium caused no change in the electrical parameters. The addition of 100 μM indomethacin to the mucosal medium inhibited both PD and SCC with a resultant increase in steady-state tissue resistance. In the presence of mucosal 100 μM indomethacin, serosal PGE_1 (60 μM) markedly stimulated transmural PD and SCC with a resultant decrease in steady-state tissue resistance. Serosal arachidonic acid (330 μM) stimulated transmural PD and SCC and this effect was abolished by the addition of 100 μM indomethacin to the mucosal medium. Serosal PGE_1 (60 μM) only stimulated the mucosa→serosa unidirectional flux of sodium. These results strongly suggest that the PGE_1 action is mediated either via a series of metabolic reactions that possibly increase the permeability of the mucosal membrane to sodium or via direct stimulation of rheogenic sodium pump activity.

5860 Na^+ TRANSPORT BY MAMMALIAN STOMACH. (Eng.) Machen, T. E.; Silen, W.; Forte, J. G. (Dept. Physiology-Anatomy, Univ. California, Berkeley, CA 94720). *Am. J. Physiol.* 234(3):E228-E235; 1978.

Gastric mucosas from newborn pigs (0-20 days) and rabbits (0-20 days) were used for an *in vitro* investigation of active Na^+ transport during resting (no HCl secretion) conditions. As measured with $^{22}Na^+$, these tissues were found to actively absorb Na^+ from the mucosal-to-serosal (m-to-s) bathing solution during both open-circuit and short-circuit current (I_{sc}) conditions. In the nonsecreting state, net Na^+ transport accounted for 40-60% of I_{sc}. The remaining current was provided by net s-to-m flux of Cl^-. Amiloride ($2\text{-}5 \times 10^{-5}$ M) in the mucosal solution abolished this active Na^+ transport by inhibiting m-to-s fluxes of Na^+ (J^{Na}_{ms}). *In vivo-in vitro* experiments showed that active Na^+ transport was a normal function of the resting mammalian stomach. Decreasing the pH of the mucosal solution to below pH 5 reversibly decreased the current-generating capability of the tissue. Pretreatment of the tissue with amiloride abolished this pH effect. The implication is that the low pH affects the Na^+-entry step into cells. "Titration curves" of current versus pH had an apparent pK of approximately 4.0. Ouabain and K^+-free solutions both caused decreases in active Na^+ and Cl^- current. Calculations indicated that a shunt may account for only a small (<30%) percentage of total transepithelial conductance.

5861 GLUCOSE AND CATION TRANSPORT IN RAT JEJUNUM, ILEUM AND COLON IN VIVO: CONTROL EXPERIMENTS, AND EFFECT OF CATIONIC SURFACTANT. (Eng.) Sund, R. B. (Inst. Pharmacy, Univ. Oslo, P.O. Box 1068, Blindern, Norway). *Acta Pharmacol. Toxicol. (Kbh.)* 42(2):117-124; 1978.

To investigate the mechanism by which surfactants affect intestinal glucose transport, osmotically balanced solutions of glucose (0.5-300 mM) and sodium chloride, containing cetrimonium bromide (cetrimide, 0.8-4.1 mM), were instilled into the jejunum, ileum, and colon of anesthetized rats. Net transport of glucose, sodium, and potassium was studied by their disappearance from or accumulation into the intestinal lumen during 15 min of incubation. Cetrimide caused the following shifts in normal jejunal and ileal glucose absorption: at low luminal glucose levels, absorption was strongly depressed and may be converted to net secretion. At intermediate levels, inhibition was less pronounced, and at high luminal glucose levels, absorption was enhanced. Similar changes were seen in the colon. Furthermore, cetrimide caused a threefold change in the regression lines relating net sodium fluxes to the initial sodium concentration. The lines became steeper, the correlation was improved, and the sodium concentration value corresponding to zero net transport was elevated. Net potassium secretion was increased. These changes are all consistent with the view that surfactants cause an increase in passive epithelial permeability. Quantitatively, the effect of cetrimide increased with localization in the order colon>ileum>jejunum. Benzalkonium chloride (0.5-1.7 mM) was tested in the ileum only, and caused similar effects.

5862 EFFECT OF DIESTER AND DIETHER PHOSPHATIDYLCHOLINE ON INTESTINAL ABSORPTION OF NEUTRAL ACIDIC STEROLS. (Eng.) O'Connor, P. J.; Loiudice, T. A.; Bochenek, W.; Rodgers, J. B. (Albany Medical Coll., Albany, NY 12208). *Am. J. Dig. Dis.* 23(4):316-320; 1978.

To determine whether the delay in cholesterol absorption noted when phosphatidylcholine is infused intraduodenally with dihydroxy bile salt plus natural phospholipid might be mediated via a delay in digestion and subsequent absorption of the phospholipid, the effects of nondigestible diether phosphatidylcholine on intestinal cholesterol and dihydroxy and trihydroxy conjugated bile salt absorption were studied in bile fistula rats using radioactive substrates. No inhibition of absorption of either dihydroxy or trihydroxy bile salts was observed. Nondigestible phospholipid did, however, significantly inhibit cholesterol absorption ($p<0.005$ when infused with taurocholate [TC]; $p<0.05$ with taurochenodeoxycholate [TCD]). Under control conditions with natural phosphatidylcholine in the intestinal perfusate, cholesterol absorption was significantly greater ($p<0.01$) when infused with TC as compared to results obtained after infusion with TCD. Studies were repeated using radioactive rat liver phosphatidylcholine to determine whether the observed decrease in cholesterol absorption could be correlated with a decrease in digestion and absorption of rat liver phosphatidylcholine. No evidence was found for decreased absorption of

this phospholipid when given with TCD. It is concluded that less cholesterol is absorbed in the presence of TCD than of TC, but the mechanism for this difference remains unexplained.

5863 VITAMIN D-3 INTESTINAL ABSORPTION IN VIVO: INFLUENCE OF FATTY ACIDS, BILE SALTS, AND PERFUSATE pH ON ABSORPTION. (Eng.) Hollander, D.; Muralidhara, K. S.; Zimmerman, A. (Scott Hall Basic Medical Sciences, 540 E. Canfield, Detroit, MI 48201). *Gut* 19(4):267-272; 1978.

Intestinal vitamin D-3 absorption in physiological concentrations was studied in the live unanesthetized rat, and the effects of fatty acids, bile salts, and perfusate pH were investigated. In both the jejunum and the ileum, a linear relation was found between the absorption rate of the vitamin and its intraluminal concentration. Increasing the sodium taurocholate concentration in the perfusate above 5 mM did not change ileal absorption rate but did decrease jejunal absorption rate. The vitamin's absorption rate was raised by increases in either the hydrogen ion concentration or the perfusate's flow rate. Addition of 2.5 mM fatty acids of varying chain length and degrees of saturation resulted in a decrease in the rate of vitamin D-3 absorption. These experiments indicate that vitamin D-3 absorption *in vivo* is mediated by passive diffusion. The rate of absorption of the vitamin is influenced by the composition of the perfusate and the thickness of the unstirred layer.

5864 ROLE OF GLUCOCORTICOIDS ON ION TRANSPORT AND TRANSMURAL PD IN COLON [Abstract]. (Eng.) Bastl, C. P.; Hayslett, J. P.; Binder, H. J. (Dept. Medicine, Temple Univ., Philadelphia, PA). *Clin. Res.* 25(3):306A; 1977.

5865 A SINGLE POPULATION OF CALCIUM CHANNELS REGULATED BY THREE DIFFERENT RECEPTORS IN THE RAT PAROTID GLAND [Abstract]. (Eng.) Putney, J. W., Jr. (Wayne State Univ., Detroit, MI 48201). *Fed. Proc.* 36(3):457; 1977.

5866 CLINICAL EVALUATION OF THE USE OF $^{47}CaCl_2$ IN A TEST OF THE GASTROINTESTINAL ABSORPTION OF CALCIUM [Abstract]. (Eng.) Hartley, T. F. (Inst. Medical and Veterinary Science, Frome Rd., Adelaide 5000, Australia). *Aust. N.Z. J. Med.* 7(3): 345; 1977.

5867 CARRIER-MEDIATED CALCIUM TRANSPORT BY GOLGI-RICH MEMBRANE VESICLES FROM RAT INTESTINE: DECREASED IN VITAMIN D DEFICIENT RATS [Abstract]. (Eng.) Freedman, R. A. (Massachusetts General Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2):1187; 1977.

5868 IRON TRANSPORT BY SMALL INTESTINAL PLASMA MEMBRANES [Abstract]. (Eng.) Eastham, E. J.; Bell, J. I.; Douglas, A. P. (Dept. Medicine, Univ. Newcastle upon Tyne, Newcastle upon Tyne, England). *Gastroenterology* 72(5, Part 2):1180; 1977.

5869 PASSAGE OF IRON AND COBALT OUT OF THE SUBCELLULAR FRACTIONS OF THE INTESTINAL MUCOSA OF THE RAT [Abstract]. (Eng.) Thomson, A. B. R.; Valberg, L. S. (Dept. Medicine, Univ. Alberta, Edmonton, Alberta, Canada). *Gastroenterology* 72(5, Part 2):1141; 1977.

5870 FUNCTIONAL SIGNIFICANCE OF INTESTINAL Na-K-ATPASE: IN VIVO OUABAIN INHIBITION OF INTESTINAL Na AND WATER ABSORPTION [Abstract]. (Eng.) Charney, A. N.; Donowitz, M. (Walter Reed Army Inst. Res., Washington, DC). *Gastroenterology* 72(5, Part 2):1037; 1977.

See also, 5890, 6018, 6023, 6050, 6224, 6250.

MOTILITY

5871 ESOPHAGEAL GANGLIA AND SMOOTH MUSCLE IN THE ELDERLY. (Eng.) Eckardt, V. F.; LeCompte, P. M. (I. Medizinische Universitatsklinik Mainz, 65 Mainz, Langenbeckstrasse 1, W. Germany). *Am. J. Dig. Dis.* 23(5):443-448; 1978.

To study the etiology of esophageal motor dysfunction in elderly persons, the histology of Auerbach's plexus and esophageal smooth muscle was examined in autopsy material from 9 young (29 ± 2.2 yr) and 15 elderly (77.4 ± 2.8 yr) subjects. There was a significant decrease in ganglion cells (1,685 ± 115.9/cm^2) in elderly subjects when compared to young controls (2,253 ± 216.9/cm^2, $p<0.05$). Lymphocytic infiltration of Auerbach's plexus was commonly observed in both groups of patients, but heavy lymphocytic infiltration was slightly more common in elderly subjects. No difference was found in thickness of esophageal smooth muscle between young and old subjects. It is concluded that diminution of

ganglion cells rather than smooth muscle atrophy may explain the frequent occurrence of esophageal motor dysfunction in elderly persons.

5872 ELECTRICAL ACTIVITY OF THE OPOSSUM LOWER ESOPHAGEAL SPHINCTER IN VIVO: ITS ROLE IN THE BASAL SPHINCTER PRESSURE. (Eng.) Asoh, R.; Goyal, R. K. (Univ. Texas Health Science Center, 5323 Harry Hines Blvd., Dallas, TX 57235). *Gastroenterology* 74(5, Part 1):835-840; 1978.

Studies were performed in anesthetized opossums to investigate the electrical control of the lower esophageal sphincter. The stomach and lower end of the esophagus were immobilized on a specially prepared stage to eliminate movement artifacts. Extracellular electrical activity was recorded with bipolar needle electrodes. The sphincter pressure was measured with a continuously perfused catheter system. The lower esophageal sphincter showed continuous spike activity with or without phasic variations in their occurrence. The usual frequency of the spikes was 20-50/min, and their mean duration was 81.2 ± 8.9 msec. The spike potentials ceased with esophageal distention, which also caused a fall in the sphincter pressure. The spikes were abolished by isoproterenol (2.5 μg/kg, i.v.) and they increased with bethanechol (20 μg/kg, i.v.). Correlation of the spike activity with the pressure revealed that the sphincter pressure was higher when the spike potentials were present, but a major part of the pressure existed in the absence of any spike activity. These studies show that (1) the opossum lower esophageal sphincter is characterized by continuous spike potentials and (2) the major fraction of the basal pressure is, however, independent of the spike potentials.

5873 MOTOR INNERVATION OF STRIATED OESOPHAGEAL MUSCLE. PART 2. CHARACTERISTICS OF THE OESOPHAGOMOTOR FIBRES IN THE RAT STUDIED BY IMPLANTING THE VAGUS NERVE INTO A SKELETAL MUSCLE. (Eng.) Gruber, H. (II. Anatomisches Institut der Universitat Wien, A-1090 Vienna, Austria). *J. Neurol. Sci.* 36(2):171-186; 1978.

In 12 rats, the right vagus nerve distal to its recurrent laryngeal branch was implanted into the inferior segment of the denervated sternohyoid muscle to determine whether the esophagomotor fibers, prior to joining the myenteric plexus, can form functionally adequate neuromuscular junctions. One month after implantation, the first signs of neuromuscular transmission at the vagal motor endings could be recorded. Two months after implantation, the reinnervated muscles showed vigorous contractions on electrical stimulation of the vagus nerve. During the performance of propulsive waves of the esophagus, the implanted vagus nerve caused clonic to tetanic contractions of the sternohyoid muscle, thus proving the esophagomotor genesis of the reinnervating nerve fibers. In addition, the vagus-innervated motor end-plates were shown to exhibit the same ultrastructural peculiarities as the original neuromuscular junctions of the esophagus. In sections stained for cholinesterase, it was demonstrated that the esophagomotor fibers had preferentially reinnervated the denervated motor end-plates. In many instances, the subneural apparatus was not completely covered by the vagal axon terminals. Newly formed, ectopic vagal motor endings were few in number and confined to muscle fibers immediately adjacent to the site of nerve-implantation. Six months after implantation, some of the vagal motor endings showed signs of degeneration. As in the esophagus, the reinnervating esophagomotor fibers proved to be unmyelinated, sometimes forming a plexus-like intramuscular network before terminating at motor end-plates. Myelinated vagal nerve fibers were also observed running between the skeletal muscle fibers, but they did not establish any demonstrable form of neuromuscular contacts. It is concluded that in the rat the myelinated fibers of the esophageal nerves are afferent, whereas the esophagomotor fibers, although supplying striated muscle, are unmyelinated.

5874 THE EFFECT OF ATROPINE ON THE LOWER ESOPHAGEAL SPHINCTER IN LATE PREGNANCY. (Eng.) Dow, T. G. B.; Brock-Utne, J. G.; Rubin, J.; Welman, S.; Dimopoulos, G. E.; Moshal, M. G. (Dept. Obstetrics and Gynecology, Univ. Natal, South Africa). *Obstet. Gynecol.* 51(4):426-430; 1978.

Intraluminal pressure and pH changes at the gastroesophageal region before and after atropine administration were studied in pregnant and nonpregnant women, because atropine is used prior to caesarean section and could possibly lead to esophageal reflux, regurgitation, and aspiration. Eight nonpregnant women, 10 pregnant women with heartburn, and 10 pregnant women without heartburn were studied. Each patient was tested under resting conditions and after the i.v. injection of atropine (0.6 mg). In both groups of pregnant patients, the intragastric pressure was higher than that of the nonpregnant subjects ($p<0.01$ before atropine, $p<0.005$ after atropine). The stomach to lower esophageal sphincter pressure (LESP) gradient under resting conditions was lowest in the pregnant patients with heartburn. After the administration of atropine, a fall in the LESP occurred in all three groups of patients and was most profound in the nonpregnant subjects (9.6 cm H_2O, $p<0.02$) and in the pregnant patients without heartburn (17.1 cm H_2O, $p<0.05$). These changes and the pH recordings of the lower esophagus indicate the adverse effect that atropine has on the competency of the LESP both in pregnancy and in the nonpregnant state. Atropine should therefore be used with caution as a premedicant and preferably combined with metoclopramide.

5875 EFFECT OF THORACIC VAGOTOMY AND VAGAL STIMULATION ON ESOPHAGEAL FUNCTION. (Eng.) Kravitz, J. J.; Snape, W. J., Jr.; Cohen, S. (Univ. Pennsylvania Hosp., Philadelphia, PA 19104). *Am. J. Physiol.* 234(4):E359-E364; 1978.

To gain information on esophageal innervation by

the thoracic portion of the vagus nerves, the effect of thoracic vagotomy and thoracic vagal stimulation upon esophageal peristalsis and lower esophageal sphincter (LES) function was studied in the opossum. The thoracic portion of the vagus nerve was sectioned in the upper or lower thorax. Bilateral, but not unilateral, thoracic vagotomy above the level of the heart abolished peristalsis and LES relaxation in response to swallowing or cervical vagal electrical stimulation. Thoracic vagotomy at the level of the ventricle or below did not alter either peristalsis or LES relaxation during swallowing or cervical vagal stimulation. Secondary peristalsis and its associated LES relaxation was unaltered by thoracic vagotomy at any level. Electrical stimulation of the distal end of the upper thoracic vagus elicited both peristalsis and LES relaxation. Electrical stimulation of the distal end of the lower thoracic vagus, as well as stimulation of the vagal branches to the terminal esophagus, gave only LES relaxation. These studies suggest that (a) the major extrinsic vagal innervation mediating primary peristalsis terminates in the upper portion of the esophagus, whereas the vagal innervation mediating LES relaxation responses are present throughout the length of the esophagus, and (b) secondary peristalsis and its associated LES relaxation occurs independent of extrinsic vagal innervation.

5876 MYOELECTRICAL AND MECHANICAL ACTIVITY OF ISOLATED CANINE STOMACH PERFUSED IN VITRO WITH FLUOROCARBON: ROLE OF GLUCOSE, PHOSPHATE, CALCIUM AND STRONTIUM IN THE PERFUSATE. (Eng.) Kowalewski, K.; Kolodej, A. (Surgical-Medical Res. Inst., Univ. Alberta, Edmonton T6G 2N8, Canada). *Pharmacology* 16(5):247-258; 1978.

Myoelectrical and mechanical activities were recorded from whole isolated canine stomachs perfused intravascularly with fluorocarbon emulsion, oxygenated *in vitro*, to assess the use of this bloodless artificial perfusate in preserving the stomach during secretory and motility studies. The perfusate was composed of an oxygen carrier (liquid fluorocarbon) emulsified with a surfactant and added to a simulated physiological solution. Bipolar electrodes and a strain gauge were used for recordings. Stomachs perfused for 5 hr displayed normal electrical and mechanical activities (i.e., identical with those observed under *in vivo* conditions or during perfusion with homologous blood). Normal responses to electrical stimulation of a vagus nerve branch or to the intraarterial injection of 10 µg methacholine or 5 µg pentagastrin were also observed. These functions of smooth muscles were not altered when glucose-free or glucose- and phosphate-free perfusate were used. In calcium-free perfusate, electrical and mechanical activities were absent, and no responses to stimulants used were recorded. When calcium was added to the perfusate, these functions were restored to normal. Strontium was found to be an adequate substitute for calcium in fluorocarbon perfusate. Gastric secretions were alkaline and contained fluorocarbon emulsion. These studies demonstrate that myoelectrical and mechanical activity of the isolated canine stomach is well preserved during perfusion with fluorocarbon emulsion.

5877 CHOLECYSTOKININ INHIBITS GASTRIC EMPTYING BY ACTING ON BOTH PROXIMAL STOMACH AND PYLORUS. (Eng.) Yamagishi, T.; Debas, H. T. (Dept. Surgery, Univ. British Columbia, Vancouver, British Columbia, V5Z 1L5, Canada). *Am. J. Physiol.* 234(4): E375-E378; 1978.

The relative importance of the ability of cholecystokinin to relax the proximal stomach and to contract the pyloric sphincter in its inhibitory effect on gastric emptying was investigated in dogs by studying the effectiveness of the C-terminal octapeptide of cholecystokinin (OP-CCK) to inhibit the emptying of a liquid meal (300 ml saline) before and after operations that either remove or destroy the pyloric mechanism (antrectomy and pyloroplasty), or lead to loss of accommodation of the proximal stomach (vagotomy), and after both vagotomy and antrectomy, and vagotomy and pyloroplasty. OP-CCK caused dose-related (32-250 ng/kg/hr) inhibition of gastric emptying in the intact dog. After either pyloroplasty or antrectomy the effectiveness of low (32-125 ng/kg/hr) but not of high doses of OP-CCK (250-500 ng/kg/hr) was lost. After vagotomy, OP-CCK at any dose was ineffective. The findings suggest that cholecystokinin inhibits gastric emptying by acting both on the pylorus and on the proximal stomach.

5878 EFFECTS OF DOMPERIDONE (R 33812) ON THE MOTOR FUNCTION OF THE STOMACH AND SMALL INTESTINE: A DOUBLE-BLIND EVALUATION. (Eng.) Baeyens, R.; Reyntjens, A.; Van de Velde, E. (Janssen Pharmaceutica N. V., B-2340 Beerse, Belgium). *Arzneim. Forsch.* 28(4):682-686; 1978.

To investigate the mechanism of the new antiemetic agent, domperidone, the effect of i.v. domperidone on the motor function of the stomach and small intestine was evaluated in three consecutive controlled studies using different treatment regimens. Two hundred one patients were referred to the radiodiagnostic department for a barium meal with a follow-through examination. In study A, 48 patients received either domperidone (8 mg) or a placebo, given simultaneously with the barium meal. In study B, the same treatment was used in 50 patients, but the injections were given 30 min before the barium. Twenty-four other patients received metoclopramide (10 mg) instead of domperidone or a placebo. In study C, the domperidone injections were given 15 min after the barium meal in 49 patients. Thirty other patients received either the placebo (10), domperidone (10), or metoclopramide (10). Peristaltic activity of the antrum, gastric emptying, and small bowel transit time were evaluated after the ingestion of the barium meal, and before and/or after the drug injections. Antral peristalsis was more activated with domperidone and metoclopramide than with placebo, but this effect was seen only when domperidone was administered either before ($p<0.05$) or after ($p<0.001$) the administration of the barium

meal. Regardless of the time of administration, gastric emptying was accelerated by domperidone ($p<0.05$) and by metoclopramide. Bowel transit was accelerated by both domperidone and metoclopramide ($p<0.01$). Both domperidone and metoclopramide improved motor function in the proximal part of the gastrointestinal tract. It is concluded that domperidone synchronizes gastrointestinal motor function due to a more protractive activity, whereas metoclopramide merely acts as a "hurrying" agent.

5879 GASTRIC EMPTYING IN THE CAT IN RESPONSE TO HYPERTONIC SOLUTIONS AND TRYPTOPHAN. (Eng.) Cooke, A. R. (Kansas Univ. Medical Center, Rainbow Blvd. at 39 St., Kansas City, KS 66103). *Am. J. Dig. Dis.* 23(4):312-315; 1978.

To study possible species differences in the response of gastric emptying to hypertonic sugar and amino acid solutions and tryptophan, gastric emptying studies were carried out in 10 cats and 4 dogs, each having a gastric fistula. Test meals of 50 ml (cats) or 300 ml (dogs) containing phenol red as a nonabsorbable marker were instilled into the stomach via the gastric fistula and were drained by gravity 25-30 min later. The test meals were water, hypertonic solutions (250-1,000 mOsm/kg) of casein hydrolysate, D-glucose, mannitol, glycine, L-alanine, D-alanine, β-alanine, L- and D-tryptophan, and L-phenylalanine in concentrations (osmolalities) ranging from 5 to 100 mM. In the cats, gastric emptying was slowed with increasing osmolality of the test solution; glucose and mannitol were equipotent but much less effective than glycine or casein hydrolysate. This difference in potencies was not found for these substances in the dogs. Gastric emptying was inhibited by tryptophan in the cats and was stereospecific, only the L form being effective. This inhibition was not due to the effect of tryptophan on acid secretion. Stereospecificity was not found for the osmoreceptor. Combining L-tryptophan with another neutral amino acid (L-alanine) inhibited the effect of tryptophan. Phenylalanine in concentrations up to 80 mM had no effect on gastric emptying in the cats. These studies indicate differences between cats and dogs in response to osmotic agents and also show that, like the dog, the cat has a tryptophan receptor.

5880 SMALL-INTESTINAL TRANSIT DURING TOTAL PARENTERAL NUTRITION IN THE RAT. (Eng.) Weisbrodt, N. W.; Badial-Aceves, F.; Copeland, E. M.; Dudrick, S. J.; Castro, G. A. (Univ. Texas Medical Sch., P.O. Box 20708, 6400 W. Cullen, Houston, TX 77030). *Am. J. Dig. Dis.* 23(4):365-369; 1978.

The hypothesis that alterations in small bowel motility are associated with total parenteral nutrition (TPN) was tested. Motility, as reflected by intestinal transit, was studied in rats maintained by TPN for 7-10 days and compared with that of rats fed a p.o. diet isocaloric with the i.v.-administered solution. Transit was measured by injecting radioactively labeled chromium ($Na_2{}^{51}CrO_4$) into the duodenum via permanently implanted catheters. The animals were killed 15 min after injecting the label, and the linear distribution of the isotope in the gut was determined. The leading edge of radioactivity traversed 75-87% (95% confidence limit) of the gut length in p.o.-fed rats and 83-97% in rats on TPN. The difference between the average position of these fronts for the two groups was not statistically significant. In addition, the regression of percentage radioactivity traversing or present in a given segment on gut length yielded a slope with 95% confidence limits of -10.48 to -15.02 for p.o.-fed control rats and -9.83 to -12.87 for rats on TPN ($p>0.05$). These results support the conclusion that factors that regulate small bowel motility are not altered significantly by TPN during the time that other functional and structural changes reportedly occur.

5881 THE SACRAL PARASYMPATHETIC REFLEX PATHWAY REGULATING COLONIC MOTILITY AND DEFAECATION IN THE CAT. (Eng.) De Groat, W. C.; Krier, J. (Medical Sch., Univ. Pittsburgh, Pittsburgh, PA 15261). *J. Physiol. (Lond.)* 276:481-500; 1978.

To examine the role of the sacral parasympathetic pathway to the colon in the regulation of colonic motility, intestinal motility and the efferent firing in postganglionic fibers on the serosal surface of the mid-distal colon were measured simultaneously in cats. Increases in efferent firing were noted during the occurrence of spontaneous propulsive activity (tonic pressure waves) or segmental contractions (slow rhythmic pressure waves). The neural discharge was not altered by transection of the lumbar sympathetic innervation to the colon but was blocked by interruption of the sacral parasympathetic outflow. Electrical stimulation of pelvic nerve afferents arising in the colon or distention of the colon or rectum evoked reflex increases in efferent firing and sustained propulsive contractions that were associated with defecation. Both responses were abolished by transection of the pelvic nerves or sacral dorsal roots. Electrical stimulation of colonic afferent fibers also evoked synchronous reflex discharges in colonic efferents at latencies ranging from 180 to 300 msec. The discharges were enhanced during propulsive contractions, and abolished by transection of the pelvic nerves but not altered by transection of the lumbar sympathetic nerves. Sacral reflexes were present in cats with an intact spinal cord and in chronic spinal animals (transection at thoracic vertebrae 10-12). The reflexes recovered within minutes to several hours after acute transection of the spinal cord. Electrophysiological measurements indicated that the sacral reflexes to the large intestine were mediated by nonmyelinated afferent and preganglionic efferent fibers. The central delay for the reflex was estimated to be 45-60 msec. It is concluded that the sacral parasympathetic reflexes to the large intestine are mediated via a spinal pathway and have an essential role in the initiation of propulsive activity during defecation.

5882 SPHINCTERIC MECHANISM OF THE MAIN PANCREATIC DUCT IN THE DOG: AN EXPERIMENTAL MODEL OF THE ISOLATED SPHINCTERIC PREPARATION. (Eng.) Sankaran, H.; FitzGerald, O.; McGeeney, K. F. (Dept. Medicine and Therapeutics, Univ. Coll., Dublin, Ireland). *Digestion* 17(3):221-228; 1978.

An *in vitro* experimental model of the sphincter at the lower end of the main pancreatic duct was developed in dogs. This model, employing a drop counter to measure the drop rate, monitors the perfusion rate of Tyrode through the sphincter. Acetylcholine (ACh; 25, 50, 100, and 200 µg), employed to establish the sensitivity and viability of the isolated sphincter, produced a contraction of the sphincter that was concentration-response related (the drop rate was reduced by 16, 22, 26, and 30%, resp.). Physiological saline, as a control, atropine (50 µg), and hexamethonium (50 µg) did not affect the drop rate. Atropine (20 µg) partially abolished the contraction produced by 50 µg of ACh; hexamethonium (50 µg) did not have an effect. Cerulein (50 µg) produced a relaxation of the sphincter; epinephrine (50 µg) produced a contraction. Both sympathetic and parasympathetic mechanisms seem to play a role in the regulation of sphincteric activity of the main pancreatic duct in dogs.

5883 CONTROL OF LOWER-ESOPHAGEAL-SPHINCTER CONTRACTILE ACTIVITY BY MOTILIN IN CONSCIOUS DOGS. (Eng.) Itoh, Z.; Aizawa, I.; Honda, R.; Hiwatashi, K.; Couch, E. F. (Gunma Univ. Sch. Medicine, Maebashi, Japan 371). *Am. J. Dig. Dis.* 23(4):341-345; 1978.

To investigate whether the lower esophageal sphincter (LES) contractions in the interdigestive state may be controlled by motilin, the effect of synthetic motilin on contractile activity in the LES and in the stomach was studied in five healthy dogs by means of chronically implanted strain gauge force transducers. Motilin produced strong contractions in the LES and the stomach simultaneously after i.v. doses ranging from 0.3 to 2.7 µg/kg/hr, which were similar to the naturally occurring interdigestive contractions in the LES and the stomach. However, these contractions could be induced only in the interdigestive state; motilin infusion in the digestive state brought about no significant effect on either the LES or the stomach. Motilin-induced contractions in the LES and the stomach were instantly abolished by food ingestion. It is considered that the contractions induced by motilin are identical with the naturally occurring interdigestive contractions in the LES and that these contractions are the most orad component of the interdigestive cyclic recurring caudad-moving bands of strong contractions in the dogs.

5884 MORPHOLOGICAL ASPECTS OF BILIARY DYNAMICS [Abstract]. (Eng.) Kyosola, K.; Rechardt, L. (No affiliation given). *Acta Anat.* 99(3): 287; 1977.

5885 HOW NOW ESOPHAGEAL PERISTALSIS? (Eng.) Diamant, N. E. (Toronto Western Hosp., 399 Bathurst St., Toronto, Ontario M5T 2S8, Canada). *Gastroenterology* 73(6):1453-1454; 1977.

5886 CONTRIBUTION OF SYMPATHO-ADRENAL SYSTEM TO THE GASTRIC MOVEMENT OF RATS SUBJECTED TO RESTRAINT AND WATER IMMERSION STRESS. (Eng.) Yano, S.; Akahane, M.; Harada, M. (Faculty Pharmaceutical Sciences, Chiba Univ., Chiba 280, Japan). *Jpn. J. Pharmacol.* 27(5):635-643; 1977.

5887 UPPER ESOPHAGEAL SPHINCTER RESPONSE TO INTRA-ESOPHAGEAL FLUIDS IN MAN [Abstract]. (Eng.) Gerhardt, D. C.; Shuck, T.; Bordeaux, R. A.; Winship, D. H. (Dept. Medicine, Univ. Missouri, Columbia, MO 65201). *Gastroenterology* 72(5, Part 2):1062; 1977

5888 HORMONAL REGULATION OF GASTRIC MUCOSAL POTENTIAL DIFFERENCE IN MAN. EFFECT OF GLUCAGON, SECRETIN, CALCITONIN AND PENTAGASTRIN [Abstract]. (Eng.) Tarnawski, A.; Ivey, K. J. (Veterans Admin. Hosp., Columbia, MO). *Gastroenterology* 72(5, Part 2):1138; 1977.

See also, 6018, 6025, 6035, 6069, 6114, 6117, 6118, 6125, 6126, 6156, 6244, 6273, 6538.

SECRETION AND METABOLISM

5889 THE NEWER GUT HORMONES: CELLULAR SOURCES, PHYSIOLOGY, PATHOLOGY, AND CLINICAL ASPECTS. (Eng.) Pearse, A. G. E.; Polak, J. M.; Bloom, S. R. (Hammersmith Hosp., Ducane Rd., London W12 OHS, England). *Gastroenterology* 72(4, Part 1): 746-761; 1977.

5890 VASOACTIVE PEPTIDES AS MEDIATORS OF INCREASED VASCULAR PERMEABILITY. (Eng.) Greenbaum, L. M. (Coll. Physicians and Surgeons, Columbia Univ., New York, NY 10032). *Trends Biochem. Sci.* 2(1):41-43; 1977.

5891 EFFECTS OF SYNTOCINON ON VIP, INSULIN AND GASTRIN [Abstract]. (Eng.) Ebeid, A. M.; Escourrou, J. C.; Murray, P.; Cook, R.; Fischer, J. E. (Massachusetts General Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2):1055; 1977.

5892 CONTINUOUS OESOPHAGEAL pH RECORDING AND ACID-CLEARING TEST. A STUDY OF REPRODUCIBILITY. (Eng.) Boesby, S. (Odense Univ. Hosp., DK-5000 Odense, Denmark). *Scand. J. Gastroenterol.* 12(2):245-247; 1977.

5893 MOLECULAR PROPERTIES OF THE NERVE GROWTH FACTOR SECRETED IN MOUSE SALIVA. (Eng.) Murphy, R. A.; Saide, J. D.; Blanchard, M. H.; Young, M. (Massachusetts General Hosp., Boston, MA). *Proc. Natl. Acad. Sci. USA* 74(7):2672-2676; 1977.

5894 EFFECTS OF PARATHYROID HORMONE ON TOTAL PROTEIN, CALCIUM, MAGNESIUM, PHOSPHORUS, SODIUM AND POTASSIUM CONCENTRATIONS OF NORMAL HUMAN PAROTID SALIVA. (Eng.) Schneider, P.; Paunier, L.; Sizonenko, P. C.; Wyss, M. (Clinique Universitaire de Pediatrie, 30 Bd de la Cluse, 1211 Geneva 4, Switzerland). *Eur. J. Clin. Invest.* 7(2):121-126; 1977.

5895 THE RELATIONSHIP BETWEEN STIMULATION-INDUCED POTASSIUM RELEASE AND AMYLASE SECRETION IN THE MOUSE PAROTID. (Eng.) Petersen, O. H.; Gray, T. A.; Hall, R. A. (Dept. Physiology, Univ. Dundee, Dundee DD1 4HN, England). *Pfluegers Arch.* 369(3):207-211; 1977.

See also, 5848, 5849, 5850, 5944, 6319, 6524, 6525.

SECRETION AND METABOLISM

Stomach

5896 EFFECT OF ETHANOL ON CANINE GASTRIC EPITHELIAL ULTRASTRUCTURE AND TRANSMUCOSAL POTENTIAL DIFFERENCE. (Eng.) Eastwood, G. L.; Erdmann, K. R. (Univ. Massachusetts Medical Sch., 55 Lake Ave. North, Worcester, MA 01605). *Am. J. Dig. Dis.* 23(5):429-435; 1978.

Changes in the gastric transmucosal potential difference (PD), as an indicator of the integrity of the gastric mucosal barrier, were correlated with morphological evidence of injury in dogs that had received either intragastric saline or 5, 10, 15, or 30% ethanol. Progressively greater decreases in PD occurred after 10, 15, and 30% ethanol, resp. The drop in PD became significant 2 min after the installation of 10% ethanol and 1 min after 15 and 30% ethanol. Increasing degrees of morphological damage were accompanied by greater, more rapid changes in PD. Furthermore, ultrastructural changes occurred within surface epithelial cells, not in the deeper parietal or zymogen cells, and initially did not involve disruption of the apical cell membrane. Typically, the tight junctions also were not affected, although in a minority of dogs, small bleblike separations of the tight junctions were seen. The authors consider the gastric mucosal barrier to be represented morphologically by the interconnecting sheet of gastric epithelial cells and that ethanol breaks the barrier by first causing intracellular injury.

5897 GASTRIC SECRETORY RESPONSE TO INTRAVENOUS AMINO ACIDS IN EVISCERATED DOGS. (Eng.) Mariano, E. C.; Landor, J. H. (New Jersey Rutgers Medical Sch., Piscataway, NJ). *Arch. Surg.* 113(5):611-614; 1978.

Eight dogs, four with intact vagi and four with vagotomy, were studied to see if the gastric secretory effect of i.v. administered L-amino acids is mediated by a gastrointestinal hormone or hormones. Amino acid infusion produced a significant secretory response in denervated stomachs (from 19.6 μEq/hr to 208 μEq/hr, $p<0.005$) and in innervated stomachs (from 157 μEq/hr to 943 μEq/hr, $p<0.025$). When the known sites of formation of gastrointestinal hormones were removed by resection of antrum, duodenum, pancreas, jejunum, ileum, and colon, the gastric stimulatory effect of amino acids was not changed significantly in denervated stomachs but was greatly increased in innervated stomachs ($p<0.025$). It is concluded that amino acids have a direct effect on parietal cell secretion that is not dependent on the intermediary release of a stimulatory hormone, and that evisceration enhances this effect in dogs with intact vagi.

5898 OXYGEN CONSUMPTION DURING CIMETIDINE AND PROSTAGLANDIN E_2 INHIBITION OF ACID SECRE-

TION. (Eng.) Cheung, L. Y.; Moody, F. G.; Larson, K.; Lowry, S. F. (Washington Univ. Sch. Medicine, 4960 Audubon Ave., St. Louis, MO 63110). *Am. J. Physiol.* 234(5):E445-E450; 1978.

Changes in oxygen consumption were determined during cimetidine and 16,16-dimethyl prostaglandin E_2 (PGE_2) inhibition of acid secretion in exteriorized segments of the greater curvature of dog stomach. Acid secretion was stimulated with an i.v. infusion of histamine (1.0 μg/kg/min) in five groups of dogs; the four experimental groups received cimetidine (50 μg/kg/min, i.v.), PGE_2 (0.4 μg/kg/min, i.v., or 25 μg/period, luminally), or thiocyanate (2.5 mg/kg/min, i.v.) during the histamine infusion. Steady-state acid secretion during histamine infusion correlated well with O_2 consumption ($r=0.85$, $p<0.01$). Cimetidine and PGE_2 inhibition of acid secretion produced a reduction of oxygen consumption to resting levels. In contrast, oxygen consumption did not decrease appreciably during thiocyanate inhibition of acid secretion. These observations suggest that the inhibitory action of cimetidine and PGE_2 precedes, whereas that of thiocyanate is at a point beyond, the transfer of energy to the process of acid production.

5899 THE EFFECT OF CIMETIDINE ON STRESS ULCERS. (Eng.) Sufian, S.; Sugimachi, K.; Leahy, J.; Matsumoto, T. (Hahnemann Medical Coll. and Hosp., 230 N. Broad St., Philadelphia, PA 19102). *Int. Surg.* 63(3):143-146; 1978.

The effect of cimetidine on stress ulcers was studied in male Wistar rats with ulcers induced by cold and restraint. The animals were divided into six groups: group I (5 rats), no stress, no treatment; group II (50 rats), stressed but no treatment; group III (10 rats) pretreated with saline then stressed; group IV (10 rats) pretreated with antacid then stressed; group V (40 rats) pretreated with cimetidine (40 μg/kg), then stressed; and group VI (20 rats) stressed then treated with cimetidine. Ulcers less than 1 mm were not considered as countable results. Ulcers occurred in the glandular portion of the stomach and were frequently associated with hemorrhage and edema. In group II, 96% of the rats developed ulcers compared to none in group I. The severity of the ulcer for group II was calculated as 2.2 on a scale of 0 to 3 (0; 1-15; 16-30; or >30 ulcers, resp.). Pretreatment with saline or antacid (groups III and IV) had no protective value; all rats in both groups developed ulcers. The severity of the ulcers was slightly lower in the antacid treated (1.9) compared with the saline treated group (2.5). Thirty-four percent in group V and 65% in group VI developed ulcers. In group V, the incidence of ulcers was markedly reduced, and the severity of the ulcer (0.5) was markedly less. Post-treatment with cimetidine decreased the severity (1.2) more than in other groups but was not as effective as pretreatment. Cimetidine seems to be very effective in preventing stress-induced ulcers in rats when instilled in the stomach prior to the stress.

5900 A PHYSIOLOGICAL ROLE FOR LUMINAL GASTRIN? (Eng.) Fiddian-Green, R. G.; Farrell, J.; Havlichek, D., Jr.; Kothary, P.; Pittenger, G. (Univ. Michigan Medical Center, Ann Arbor, MI 48109). *Surgery* 83(6):663-668; 1978.

The possibility that luminal gastrin might participate in the physiological control of acid secretion was examined in 45 healthy subjects. Exogenous gastrin was infused into the lumen of the stomach in concentrations (100, 200, and 400 pg/ml) that previously had been detected as immunoreactive gastrin (IRG) in gastric juice, and the secretory responses were monitored with the intragastric titration technique. Exogenous luminal gastrin induced a dose-related increase in the background secretory response to gastric distention with water ($p<0.001$). The secretory responses to exogenous gastrin were accompanied by the disappearance of the gastrin from gastric juice ($p<0.001$) and, in some circumstances, by the appearance of IRG in the circulation ($p<0.005$). Inhibition of the secretory response to distention with water, induced by substituting saline for water or by administering Boots' secretin, was accompanied by the appearance of endogenous IRG in gastric juice ($p<0.05$). Recovery in secretory rate, after these inhibitory stimuli, was accompanied by the disappearance of the endogenous IRG from gastric juice ($p<0.05$), just as the secretory response to exogenous gastrin had been accompanied by the disappearance of exogenous gastrin from gastric juice. The inhibitory stimuli did not alter the concentrations of IRG in serum. These data suggest that luminal gastrin may participate in the physiological control of acid secretion.

5901 INFLUENCE OF VAGUS ON MECHANISMS FOR STIMULATION AND INHIBITION OF GASTRIN RELEASE. (Eng.) Schafmayer, A.; Teichmann, R. K.; Swierczek, J. S.; Rayford, P. L.; Thompson, J. C. (Univ. Gottingen, Gottingen, W. Germany). *Surgery* 83(6):711-716; 1978.

To clarify the means by which vagotomy influences gastrin release, the gastrin response to food, bombesin (1 μg/kg/hr), and somatostatin (2.5 and 5.0 μg/kg/hr) plus food was determined in dogs before and after truncal vagotomy. Vagotomy caused an increase in basal gastrin levels and in gastrin release after bombesin and food (from 49 ± 5 to 80 ± 5 pg/ml, $p<0.05$; from 51.4 to 193.4 ng/min/ml, $p<0.05$; and from 15.2 to 19.6 ng/min/ml, $p<0.05$, resp.). Vagotomy augmented somatostatin suppression of food-stimulated gastrin release in a dose-dependent manner. The authors suggest that vagotomy causes a loss of both stimulatory and inhibitory vagal effects on gastrin release. Loss of vagal inhibition results in increased gastrin release to bombesin and food. Loss of vagal stimulation results in intensification of somatostatin-induced inhibition of postprandial gastrin release.

5902 CHARACTERISTICS AND TACHYPHYLAXIS OF GASTRIN-STIMULATED GASTRIC ACID SECRETION IN

THE CAT. (Eng.) Hirst, B. H.; Labib, L. A.; Reed, J. D. (Medical Sch., Univ. Newcastle upon Tyne, Newcastle upon Tyne NE1 7RU, England). *J. Physiol. (Lond.)* 276:1-11; 1978.

To determine the effects of tachyphylaxis of acid secretion on the shape of the dose-response curve to pentagastrin and on maximum acid secretion in response to pentagastrin, conscious cats were fitted with chronic cannulated gastric fistulae and subjected to single- and multiple-dose assay systems. There was a significant positive correlation (r=0.557) between the peak acid secretion in response to pentagastrin (8 µg/kg/hr) and body weight; male cats, which were heavier, secreted significantly greater amounts of acid in response to pentagastrin than females. The difference was lessened, but not eliminated, by expressing the acid output in terms of body weight. Pentagastrin stimulated a dose-dependent increase in acid secretion in the range 0.5-32 µg/kg/hr when the response to each dose was assayed on separate occasions. Pentagastrin (64 µg/kg/hr) did not produce a further increase in acid secretion. The acid response to pentagastrin (1-16 µg/kg/hr) assayed on a single occasion by a continuous infusion method showed a dose-response relationship up to 8 µg/kg/hr where it reached a plateau of secretion. There was no difference between the two methods of assaying the gastric acid-stimulating activity using doses of pentagastrin up to 8 µg/kg/hr. The acid secretion in response to pentagastrin (8 µg/kg/hr) reached a maximum after 45 min of stimulation and thereafter showed tachyphylaxis. Over a 5-hr period, there were at least two phases of tachyphylaxis distinguishable. During the period of 0.75-2.5 hr of stimulation, there was a fast phase of tachyphylaxis (-32.0 µEq H^+/kg/15 min). This was followed by a slow phase of tachyphylaxis (-9.4 µEq H^+/kg/15 min), 2.75-5 hr of stimulation. The absolute rate of the fast phase of tachyphylaxis of acid secretion (µEq H^+/kg/15 min) increased with increasing doses of pentagastrin, but the rates of tachyphylaxis were similar when expressed as a percentage of the peak acid response to the particular dose of pentagastrin (5.1-7.8%/15 min). Synthetic human gastrin-17, the synthetic C-terminal decapeptide of human gastrin, and the C-terminal tetrapeptide of gastrin elicited comparable rates of tachyphylaxis. Two possible receptor models for the tachyphylaxis of gastrin-stimulated acid secretion, seen in other biological systems, are discussed: an allosteric model proposing the existence of a second receptor site with progressive occupation, leading to desensitization of the stimulatory receptor site and a model that proposes an agonist-induced conformational change in the receptor that is incompatible with further activation.

5903 EFFECT OF GLUCOCORTICOIDS ON GASTRIN SECRETION IN MAN. (Eng.) Seino, S.; Seino, Y.; Matsukura, S.; Kurahachi, H.; Ikeda, M.; Yawata, M.; *et al.* (Kobe Univ. Sch. Medicine, Kusunoki-cho, Ikuta-ku, Kobe, Japan). *Gut* 19(1):10-13; 1978.

To investigate the acute and chronic effects of glucocorticoids on plasma gastrin levels, plasma gastrin levels were measured by radioimmunoassay in 6 patients with Cushing's syndrome, 10 patients on long-term treatment with glucocorticoids (total dose >500 mg for >3 weeks), 11 normal subjects on short-term glucocorticoid treatment (30 mg/day, 3 days, p.o.), and 45 normal controls. The fasting plasma gastrin levels in the patients with Cushing's syndrome and in those on long-term steroid treatment (105 ± 20 pM and 73 ± 10 pM, resp.) were significantly higher than those in the untreated normal subjects and those on short-term therapy (43 ± 2 pM and 43 ± 3 pM, resp., $p<0.01$). The plasma gastrin response to food was tested in six normal untreated subjects, six patients on short-term treatment, and six patients on long-term treatment. The mean basal and 30-min postprandial plasma gastrin levels in the patients on long-term therapy (74 ± 10 pM and 231 ± 41 pM, resp.) were significantly higher than the corresponding values in untreated normal subjects and those on short-term steroid treatment ($p<0.05$). The i.v. infusion of 250 or 500 mg of hydrocortisone had no significant influence on gastrin secretion in five normal subjects. The results suggest that chronic exogenous or endogenous excess of glucocorticoids leads to hypergastrinemia, whereas an acute excess has no significant influence on gastrin secretion.

5904 DISTRIBUTION OF PROSTAGLANDIN-SENSITIVE ADENYLATE CYCLASE IN HUMAN UPPER GASTROINTESTINAL TRACT. (Eng.) Simon, B.; Kather, H. (Medizinische Universitatsklinik, Bergheimerstrasse 58, D-6900 Heidelberg, W. Germany). *Digestion* 17 (3):264-267; 1978.

The topographical distribution of the prostaglandin-sensitive adenylate cyclase in the upper gastrointestinal tract was studied in human biopsy specimens. The prostaglandin-sensitive enzyme was almost evenly distributed throughout the fundic, antral, and duodenal mucosa. The enhancement of enzyme activity in the presence of a maximally effective prostaglandin concentration (0.3 mM) exceeded basal levels by about 200%. The H_2-receptor blocking agent cimetidine (up to 50 mM) and the β-blocking agent propranolol (up to 50 mM) did not reduce the prostaglandin-sensitive enzyme system in contrast to their inhibitory effects on their respective agonists. The physiological role of the prostaglandin-sensitive adenylate cyclase in gastric and duodenal function, however, remains to be established.

5905 METHYLATED ANALOGUES OF PROSTAGLANDIN E_2 AND THE GASTRIC MUCOSAL BARRIER. (Eng.) Kenyon, G. S.; Ansell, I. F.; Carter, D. C. (Edinburgh Univ. Medical Sch., Edinburgh, Scotland). *Prostaglandins* 15(5):779-794; 1978.

The effects of 15(R)-methyl prostaglandin E_2 methyl ester (15 MPG) and 16,16-dimethyl prostaglandin E_2 methyl ester (16DMPG) on gastric mucosal permeability to Na^+ and H^+ were investigated in three male mongrel dogs prepared by antrectomy and construction of a vagally-denervated fundic pouch. It was also deter-

mined if the adverse effects that occur following doses of 16DMPG are of a magnitude liable to be used clinically to suppress gastric secretion. 15MPG did not increase mucosal permeability to either ion when given topically (18.75-300 μg) or i.v. (30 μg) and did not affect permeability increases induced by topical 5 mM sodium taurocholate in acid solution. 16DMPG caused significant ($p<0.05$) increases in net Na^+ gain when given topically (18.75-75 μg) but did not affect net H^+ loss from the pouch lumen. Attempts to use higher doses of 16DMPG were abandoned because of bleeding from the pouch, and perforation in one animal. It is conceivable that 16DMPG could cause adverse effects on the gastric mucosal barrier if used to suppress gastric secretion therapeutically. 15MPG does not share this potentially harmful property and remains worthy of further study as an inhibitor of gastric secretion having therapeutic promise.

5906 EFFECTS OF INTRA-ARTERIAL INFUSION OF PROSTAGLANDIN E_1 ON GASTRIC SECRETION AND BLOOD FLOW. (Eng.) Cheung, L. Y.; Lowry, S. F. (Washington Univ. Sch. Medicine, 4960 Audubon Ave., St. Louis, MO 63110). *Surgery* 83(6):699-704; 1978.

Since prostaglandin E_1 (PGE_1) is not only an effective inhibitor of acid secretion but also a potent vasodilator, it provides an opportunity to study dissociative changes in gastric acid secretion and blood flow. The effect of intra-arterial infusion of PGE_1 on gastric total and mucosal blood flow and acid secretion was studied in an exteriorized, chambered preparation of canine fundic stomach. Total gastric blood flow was measured simultaneously by venous outflow and by gamma-labeled microspheres. Mucosal blood flow also was measured by microspheres. The intra-arterial infusion of PGE_1 at 1.0 μg/min completely inhibited histamine-stimulated acid secretion. This inhibition was accompanied by a significant increase in both total ($p<0.01$) and mucosal blood flow ($p<0.01$). The ratio of mucosal to total blood flow remained unchanged during histamine (1.0 μg/kg) stimulation (78 ± 4%) and PGE_1 (1.0 μg/min) inhibition (79 ± 4%). The results suggest that inhibition of acid secretion can occur in the face of increased blood flow. This observation is contrary to the generally accepted concept that inhibition of acid secretion always is associated with a decrease in mucosal blood flow.

5907 STIMULATION OF MUCUS AND NONPARIETAL CELL SECRETION BY THE E_2 PROSTAGLANDINS. (Eng.) Bolton, J. P.; Palmer, D.; Cohen, M. M. (Univ. British Columbia, 700 W. 10 Ave., Vancouver, British Columbia V5Z 1L5, Canada). *Am. J. Dig. Dis.* 23(4): 359-364; 1978.

To investigate the mechanism of the protective action of prostaglandin E_2 (PGE_2) on the rat gastric mucosa, the effects of PGE_2, 15-methyl prostaglandin E_2 (15M), and 16,16-dimethyl prostaglandin E_2 (16DM) on gastric mucus and nonparietal cell secretion were measured. Alcian blue binding was used as a measure of gastric mucus. Applied topically, all three agents stimulated nonparietal cell secretion, and PGE_2 and 16DM stimulated the secretion of mucus ($p<0.01$), increasing the fraction in the gastric contents but not that adherent to the mucosa. Topical 15M did not stimulate the production of mucus. Given i.v., all three agents increased the amount of mucus in the gastric contents ($p<0.01$) without altering the amount of mucus bound to the mucosa. The prostaglandins had no effect on nonparietal cell secretion when given i.v. Topical application of each agent produced a highly significant ($p<0.01$) reduction in acid output. These effects could be relevant to the ability of the E_2 prostaglandins to protect the gastric mucosa from damage.

5908 EFFECTS OF E PROSTAGLANDINS ON CANINE GASTRIC POTENTIAL DIFFERENCE. (Eng.) Dajani, E. Z.; Callison, D. A.; Bertermann, R. E. (Dept. Biological Res., Searle Lab., Box 5110, Chicago, IL 60680). *Am. J. Dig. Dis.* 23(5):436-442; 1978.

Measurement of the gastric transmucosal potential difference (PD) was used to study the effect of gastric antisecretory prostaglandins on the integrity of the gastric mucosa of the Heidenhain pouch dog. The intragastric administration of SC-29333 [(±)-15-deoxy-16-α,β-hydroxy-16-methyl PGE_1 methyl ester] at 10 and 30 μg/kg slightly but significantly increased the transmucosal PD when compared to vehicle control ($p<0.05$). In addition, SC-29333 administered either i.v. or intragastrically significantly inhibited the PD fall induced by aspirin ($p<0.05$). In contrast, the intragastric administration of 16,16-dimethyl PGE_2 methyl ester (Me-PGE_2) significantly lowered the transmucosal PD ($p<0.05$) and failed to modify the actions of aspirin on the integrity of the gastric mucosa. However, the i.v. administration of either prostaglandin did not affect the basal transmucosal PD values. These studies suggest that SC-29333 may strengthen the integrity of the gastric mucosal barrier against aspirin, and this effect could have important therapeutic potential.

5909 EFFECTS OF SYNTHETIC VASOACTIVE INTESTINAL PEPTIDE (VIP), SECRETIN AND THEIR PARTIAL SEQUENCES ON GASTRIC SECRETION. (Eng.) Makhlouf, G. M.; Zfass, A. M.; Said, S. I.; Schebalin, M. (Medical Coll. Virginia, Richmond, VA 23298). *Proc. Soc. Exp. Biol. Med.* 157(4):565-568; 1978.

The effects of synthetic porcine vasoactive intestinal peptide (VIP) and secretin on pentagastrin-stimulated gastric secretion were compared in dogs with gastric fistulae. The infusion of both synthetic VIP (0.5 μg/kg/min, for 7.5 min) and synthetic secretin (0.05 μg/kg/min) produced a prompt inhibition of acid secretion, which reached a nadir in the first 30 min. VIP inhibited the maximal pepsin response by 65 ± 10% ($p<0.01$). The inhibition of pentagastrin-stimulated acid secretion by VIP was significantly greater at the lowest dose of pentagastrin (0.25 μg/kg/hr) than at the highest

dose (16 μg/kg/hr, 57 ± 7% versus 23 ± 7%, $p<0.01$). Dose-response analysis (response versus response/dose) indicated that inhibition was of the competitive type. An apparent inhibitor dissociation constant for VIP was calculated to be 0.43 μg/kg/min. Percent inhibition of acid secretion by secretin did not vary with the dose of pentagastrin and was consistent with inhibition of the noncompetitive type. Carboxyl-terminal partial sequences of VIP and secretin, at approximately 10 times the molar doses of the parent peptides, had no detectable inhibitory effect. Synthetic VIP appears to be less effective than synthetic secretin, at least in terms of the doses required for an equivalent degree of inhibition of gastric secretion.

5910 COMPARISON OF GASTRIC RESPONSES TO SMALL INTESTINAL RESECTION AND BYPASS IN RATS. (Eng.) Bowen, J. C.; Paddack, G. L.; Bush, J. C.; Wilson, R. J.; Johnson, L. R. (Ochsner Clinic, 1514 Jefferson Highway, New Orleans, LA 70121). *Surgery* 83(4):402-405; 1978.

To clarify the divergent gastrin responses to small intestinal resection and bypass, male Sprague-Dawley rats were subjected to either 90% intestinal resection (n=10), 90% intestinal bypass (n=10), or a sham intestinal operation (n=10). After 8 weeks, fasting serum gastrin levels were increased significantly ($p<0.001$) in the resection group (36.6 ± 2.6 fmol/ml), as compared with the sham group (20.4 ± 2.4 fmol/ml) and the bypass group (23.3 ± 4.0 fmol/ml). Antral gastrin levels also were increased significantly ($p<0.01$) in the resection group (2.92 ± 0.09 nmol/g wet weight) but were not significantly different in the bypass group (2.55 ± 0.17 nmol/g) as compared with the sham group (2.43 ± 0.12 nmol/g). Oxyntic gland carbonic anhydrase followed the same pattern, i.e., increased significantly ($p<0.02$) in the resection group (44.3 ± 3.3 U/mg protein) but not significantly different in the bypass group (38.5 ± 2.4 U/mg protein) as compared with the sham group (33.8 ± 2.2 U/mg protein). Fundic pepsinogen activity was not significantly changed in either the resection or bypass groups; it was the only measured parameter that did not increase after small intestinal resection. The data show that, in contrast with jejunoileal bypass, massive small intestinal resection in the rat causes a significant increase in serum gastrin with concomitant trophic changes in the stomach. It is concluded that the small intestine is an important regulator of gastric function, even when removed from intestinal continuity and left *in situ* by intestinal bypass.

5911 PLASMA GASTRIN LEVELS FOLLOWING DIETARY PROTEIN STIMULATION. (Spa.) Varas Lorenzo, M. J.; Luque Gonzalez, M. T. (Hospitalet de Llobregat, B arcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 51(4):363-380; 1977.

5912 ^{14}C-HISTAMINE BINDING TO PLASMA MEMBRANES OF RAT GASTRIC MUCOSA CELLS. (Rus.) Bersimbaev, R. I. (Inst. Cytology and Genetics, Siberian Branch Acad. Sciences USSR, Novosibirsk, USSR). *Vopr. Med. Khim.* 22(6):728-732; 1976.

5913 DYNAMICS OF GASTRIC SECRETION IN RESPONSE TO HISTAMINE STIMULATION FOLLOWING ANTRECTOMY IN DOGS. (Rus.) Zubenko, Iu. M.; Fisher, A. A.; Poliak, R. I. (Dept. Operative Surgery, Stavropol Medical Inst., Stavropol, USSR). *Patol. Fiziol. Eksp. Ter.* 4:78-80; 1976.

5914 HEALING OF STRESS-INDUCED GASTRIC ULCER BY HISTAMINE AND PLACEBO TREATMENT. (Ger.) Halter, F.; Barbezat, G. O.; Van Hoorn-Hickman, R.; Van Hoorn, W. (Gastrointestinal Clinic, Univ. Cape Town, Cape Town, South Africa). *Z. Gastroenterol.* 15(10):618-619; 1977.

5915 CHANGES IN THE ACETYLCHOLINE CONTENT AND IN THE CHOLINESTERASE ACTIVITY IN THE GASTRIC TISSUES FOLLOWING INDUCTION OF "STEROID" GASTRIC ULCERS IN ANIMALS. (Rus.) Bondarenko, Iu. I. (Dept. Pathophysiology, Ternopol Medical Inst., Ternopol, USSR). *Patol. Fiziol. Eksp. Ter.* (2):83-84; 1977.

5916 ACUTE EROSIVE GASTRITIS INDUCED BY L-DOPA, KETOPROFEN AND IBUPROFEN IN THE RAT [Abstract]. (Eng.) Mann, N. S. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2): 1094; 1977.

5917 MECHANISM UNDERLYING THE INFLUENCE OF PHENTOLAMINE, AN α-ADRENOBLOCKING AGENT, ON GASTRIC SECRETION IN DOGS. (Rus.) Korshak, A. L. (Dept. Pharmacology and Experimental Pathology of the Digestive Tract, Kiev Univ., Kiev, USSR). *Farmacol. Toksikol.* 39(6):678-680; 1976.

5918 INFLUENCE OF PHYSICAL LOAD ON BASAL GASTRIC SECRETION. (Ger.) Markiewicz, K.; Cholewa, M.; Gorski, L.; Chmura, J. (Institut fur Innere Medizin, Medizinische Akademie Lodz, Lodz, Poland). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(2): 73-77; 1977.

5919 CHLORIDE ION TRANSPORT IN THE PARIETAL CELLS OF GASTRIC MUCOSA: ELECTRON MICROSCOPIC, HISTOCHEMICAL, AND AUTORADIOGRAPHIC STUDY. (Rus.) Morozov, I. A. (Inst. Nutrition, USSR Acad. Medical Sciences, Moscow, USSR). *Biull. Eksp. Biol. Med.* 84(7):29-32; 1977.

5920 NEUTRALIZING EFFECTS OF A CALCIUM-FREE AND A CALCIUM-CONTAINING ANTACID. (Ger.) Weingart, J.; Haase, W.; Ottenjann, R. (Stadt. Krankenhaus Munchen-Neuperlach, Oskar Maria Graf-Ring 51, 8 Munchen 83, W. Germany). *Fortschr. Med.* 95(44): 2681-2684; 1977.

5921 THE EFFECT OF CALCITONIN ON STRESS ULCERS IN THE RAT. (Ger.) Hofbauer, F.; Jakesz, R.; Lehr, L.; Schiessel, R. (I. Chirurgische Universitatsklinik, Alser Strasse 4, A-1090 Vienna, Austria). *Z. Exp. Chir.* 10(5):297-300; 1977.

5922 PHYSIOLOGY AND PATHOPHYSIOLOGY OF GASTROINTESTINAL HORMONES OF THE GASTRIN AND SECRETIN GROUP. PART II: CHOLECYSTOKININ-PANCREOZYMIN AND SECRETIN GROUP. (Ger.) Hausamen, T. U.; Fritsch, W. P. (Stadt. Kliniken Dortmund, Beurhausstrasse 40, 4600 Dortmund, W. Germany). *Z. Gastroenterol.* 15(5):320-336; 1977.

5923 GASTROINTESTINAL HORMONES. PART I. GASTRIN. (Swe.) Bergstrom, P. (No affiliation given). *Sven. Farm. Tidskr.* 80(11/12):385-399; 1976.

5924 GASTRIN, ITS MECHANISM OF ACTION AND REGULATION. (Fre.) Bonfils, S. (INSERM, U-10, Hopital Bichat, 170, boulevard Ney, 75877 Paris Cedex 18, France). *Actual. Pharmacol. (Paris)* (28): 65-86; 1977.

5925 ANTISECRETORY AND CYTOPROTECTIVE EFFECTS OF PROSTACYCLIN (PGI_2) [Abstract]. (Eng.) Robert, A.; Hanchar, A. J.; Lancaster, C.; Nezamis, J. E. (Upjohn Co., Kalamazoo, MI 49001). *Fed. Proc.* 37(3):460; 1978.

5926 GASTRIC ANTISECRETORY ACTIONS OF PROPANTHELINE BROMIDE AND METIAMIDE IN CONSCIOUS RHESUS MONKEYS [Abstract]. (Eng.) Callison, D. A.; Dajani, E. Z.; Bianchi, R. G. (Searle Lab., P.O. Box 5110, Chicago, IL 60680). *Fed. Proc.* 37(3): 460; 1978.

5927 GASTRIC ANTISECRETORY AND ANTIULCER EFFECTS OF P-CHLOROMERCURIBENZENESULFONATE (PCMBS) IN RATS [Abstract]. (Eng.) Ellert, M.; Solberg, L. A., Jr. (Southern Illinois Univ. Sch. Medicine, Carbondale, IL 62901). *Fed. Proc.* 37(3): 696; 1978.

5928 HISTAMINE AND GASTRIN ARE NOT EQUAL STIMULANTS OF GASTRIC ACID SECRETION IN THE MONKEY [Abstract]. (Eng.) Trout, H. H., III; Harmon, J. W.; Lewis, C. D. (Walter Reed Army Inst. Res., Washington, DC 20012). *Fed. Proc.* 37(3): 459; 1978.

5929 INHIBITION OF VOLUME SECRETION IN FROG GASTRIC MUCOSA BY HYPOTONIC SOLUTION IN THE LUMEN [Abstract]. (Eng.) Durbin, R. P. (Univ. California, San Francisco, CA 94143). *Fed. Proc.* 37(3):459; 1978.

5930 EPISODIC GASTRIC ACID SECRETION IN RHESUS MONKEYS [Abstract]. (Eng.) Hamilton, B. E.; Brooks, L. A.; Natelson, B. H. (New Jersey Medical Sch., Newark, NJ). *Fed. Proc.* 37(3):459; 1978.

5931 EFFECT OF LIQUID DIETS ON GASTRIN LEVELS AND MUCOSAL GROWTH IN RATS [Abstract]. (Eng.) Sircar, B.; Lichtenberger, L. M.; Johnson, L. R. (Univ. Texas Medical Sch., Houston, TX 77025). *Fed. Proc.* 37(3):373; 1978.

See also, 5845, 5848, 5886, 5889, 6022, 6078, 6150, 6156, 6177, 6178, 6181, 6189, 6510, 6524.

SECRETION AND METABOLISM

Pancreas

5932 EVIDENCE FOR PYLOROPANCREATIC REFLEX FOR PANCREATIC EXOCRINE SECRETION. (Eng.) Debas, H. T.; Yamagishi, T. (Dept. Surgery, Univ. British Columbia, Vancouver, Canada). *Am. J. Physiol.* 234(5):E468-E471; 1978.

In seven dogs provided with an innervated pouch of the pyloric antrum, a gastric fistula, and a chronic pancreatic fistula, the effect of graded antral distention on pancreatic exocrine secretion was studied to gain information on the role of a gastropancreatic reflex in pancreatic secretion. The effect of antral distention was tested both when gastrin release was promoted (alkaline distention) and when gastrin release was blocked (acid distention). These studies were performed both before and after transthoracic truncal vagotomy. Graded alkaline antral distention caused graded rise in protein-rich pancreatic secretion ($p<0.05$ at 10 min; $p<0.001$ at 20, 30, and 40 min) and a graded increase in the concentration of serum immunoreactive gastrin. A similar pancreatic protein

secretory response was also seen with graded acid distention, although this time no rise in serum gastrin concentration occurred. Pancreatic response to antral distention with either alkali or acid was completely inhibited by pretreatment of the animals with systemic atropine (0.2 mg/kg, s.c.). Truncal vagotomy reduced pancreatic response to alkaline antral distention by 90% but completely abolished pancreatic response to distention of the antrum with acid. These studies provide evidence for a pyloropancreatic reflex mechanism for pancreatic secretion that is cholinergic and requires intact long vagal pathways.

5933 EFFECT OF CONTINUOUS JEJUNAL PERFUSION OF ELEMENTAL AND COMPLEX NUTRITIONAL SOLUTIONS ON PANCREATIC ENZYME SECRETION IN HUMAN SUBJECTS. (Eng.) Vidon, N.; Hecketsweiler, P.; Butel, J.; Bernier, J. J. (INSERM U. 54, Hopital Saint-Lazare, Paris, France). *Gut* 19(3):194-198; 1978.

To determine the effect of jejunal perfusion of an elemental diet on pancreatic enzyme secretion, pancreatic lipase and chymotrypsin secretion in response to elemental diets and a crushed food homogenate was studied in 17 normal subjects. The solutions were infused at constant flow rates (2 ml/min for crushed food; 1, 2, and 3 ml/min for elemental diet) at the ligament of Treitz with polyethylene glycol as a nonabsorbable marker. A triple lumen tube was used, enabling collection of secretions at 35 and 70 cm from the infusion point. Pancreatic secretion of lipase and chymotrypsin was found to vary with the elemental diet flow rate. However, for the same caloric value, enzyme flow rate was greater with the crushed food homogenate than with the elemental diet. This rate was directly related to the nitrogenous load; the load was 13.89 ± 0.30 mg/min with the crushed food homogenate at 2 ml/min, whereas the values for the elemental diet at 1, 2, and 3 ml/min were 3.39 ± 0.05, 6.60 ± 0.12, and 10.17 ± 0.16 ml/min, resp. There was no significant difference between enzyme secretion with either diluted or undiluted elemental diet when the caloric value was kept constant. The results indicate that pancreatic enzyme secretion occurs in response to jejunal perfusion of both elemental diet and crushed food homogenate. Pancreatic enzyme secretion increases with the caloric and nitrogenous loads infused, but the volume or osmolality of the infused solution does not affect it. The findings imply that the only means of significantly reducing pancreatic secretion during the treatment of pancreatitis may be through parenteral feeding.

5934 EFFECTS OF A PROTEIN MEAL, INTRADUODENAL HCl, AND OLEIC ACID ON PORTAL AND PERIPHERAL VENOUS SECRETIN AND ON PANCREATIC BICARBONATE SECRETION. (Eng.) Boden, G.; Wilson, R. M.; Essa-Koumar, N.; Owen, O. E. (Temple Univ. Health Sciences Center, Philadelphia, PA 19140). *Gut* 19(4): 277-283; 1978.

To determine the role of secretin in postprandial pancreatic water and bicarbonate secretion, the effect of a protein meal on immunoreactive secretin (IRS) concentration was studied in dogs and humans using a radioimmunoassay of improved sensitivity (8 pg/ml). After a 600-g protein meal, pancreatic bicarbonate secretion (PBS) in the dogs increased markedly during the first 15 min after feeding ($p<0.01$), and proximal duodenal pH decreased from 6.2 to 4.3 ($p<0.001$). Portal and peripheral IRS concentrations, however, remained unchanged in eight dogs and five patients with liver cirrhosis after ingesting a meal (meat in the dogs, mixed in the humans). An alkaline solution of sodium oleate (pH 9.2) stimulated PBS but not IRS when infused in dogs. Intraduodenal administration of various amounts of HCl in dogs demonstrated that acid-stimulated PBS was invariably accompanied by rises in peripheral venous IRS concentration. It is concluded that the postprandial stimulation of PBS involves mechanisms more complex than acid-stimulated secretin release.

5935 QUANTITATION OF ULTRASTRUCTURAL CHANGES IN MOUSE PANCREATIC ACINAR CELLS CAUSED BY FOREIGN SERUM. (Eng.) Nevalainen, T. J. (Lab. Electron Microscopy, Univ. Turku, Kiinamyllynkatu 10, SF-20520 Turku 52, Finland). *Exp. Cell Biol.* 46(4):193-198; 1978.

Quantitative changes in the pancreatic acinar cell organelles were observed in BALB/c mice injected i.p. with 1.0 ml fresh rabbit serum to study the mechanism by which serum initiates pancreatitis. Groups of five mice each were killed at 0, 1, 3, 6, and 12 hr after the serum injection. Pancreatic tissue was processed for electron microscopy by glutaraldehyde and osmium tetroxide fixation and Epon embedding. The proportions of acinar cell cytoplasm (volume fractions) occupied by zymogen granules, granular endoplasmic reticulum, Golgi apparatus, mitochondria, and lysosomes (including autophagosomes) were determined by the point counting method from electron micrographs. The volume fraction of lysosomes increased during the first 3 hr and remained markedly elevated up to 12 hr. The volume fractions of mitochondria and endoplasmic reticulum decreased slightly in 12 hr. The volume fraction of zymogen granules increased from 12% to 28% in 12 hr. It is concluded that the secretory mechanism of pancreatic acinar cells is injured by the foreign serum, and that this injury causes accumulation of zymogen granules and increased autophagic activity in the acinar cells.

5936 SECRETORY PATTERN AND PATHOLOGICAL STUDY OF THE PANCREAS OF STEROID-TREATED RATS. (Eng.) Bourry, J.; Sarles, H. (Unite de Recherches de Pathologie Digestive, U31, INSERM 46, chemin de la Gaye, 13009 Marseille, France). *Am. J. Dig. Dis.* 23(5):423-428; 1978.

To gain information on the mechanism of steroid-induced pancreatitis, modifications of pancreatic secretion induced by prolonged administration of corticosteroids were studied in rats, and these physiological modifications were correlated with

the development of pancreatic lesions. Male Sprague-Dawley rats received prednisolone (2.5 mg/kg/day) in drinking water during 1.5 to 12.5 months, and an equal group of matched controls received water alone. The most significant ($p<0.1$ due to the small sample size) pathological effects at 1.5-12.5 months of steroids were dilatation of acini, flattening of duct epithelium, and the presence of protein plugs in the ducts. The most significant ($p<0.05$) functional modifications at 9-11 months of treatment were increased concentration and output of proteins both in basal and stimulated pancreatic secretion of steroid-treated rats. This is very similar to the results observed previously in alcohol-induced pancreatitis. It is assumed that the hyperconcentration could be at least partly responsible for precipitation of proteins and the precipitate formation for the lesions. For the large group of acute or chronic pancreatic lesions characterized by the formation of protein plugs in the ducts, the term catarrhal pancreatitis is proposed.

5937 THE PERMEABILITY OF THE SECRETIN STIMULATED EXOCRINE PANCREAS TO NON-ELECTROLYTES. (Eng.) Dewhurst, D. G.; Hadi, N. A.; Hutson, D.; Scratcherd, T. (Dept. Physiology, Univ. Sheffield, Sheffield S10 2TN, England). *J. Physiol. (Lond.)* 277:103-114; 1978.

A method of measuring the permeability of the pancreas by determining the apparent reflection coefficient (σ^A) is described in the isolated cat pancreas secreting maximally under the influence of secretin. The principle is to add a nonelectrolyte to the perfusate that will create an osmotic gradient ($RT\sigma\Delta C$) counter to that of active transport and reduce the secretion rate. This effect is compared with that of an equal concentration (0.1 M) of sucrose ($RT\Delta C$, $\sigma=1$). The apparent reflection coefficient is obtained by dividing the percentage reduction in the secretion rate due to the test molecule with that due to sucrose. For every 10-mM increase in sucrose concentration in the perfusate, the secretion rate was inhibited by 7.1%. It was estimated that an osmotic gradient of 131 mOsm/kg water will cause zero flow rate. This gradient is a measure of the pressure required to counteract the local osmotic gradient set up by active transport and is equivalent to about 3.4 atmospheres. Nonelectrolytes with molecular volumes greater than about 85 cm^3/mol were relatively impermeable; below this value, they entered the pancreatic juice with increasing ease as the molecular volume decreased. σ^A for urea was 0.17; ethanediol, 0.27; thiourea, 0.51; glycerol, 0.69; creatinine, 0.81; erythritol, 0.91; arabinose, 0.96; xylose, 0.98; and sorbitol, 0.98. For molecules with σ^A between 0.81 and 1.0, an osmotic load of 0.1 M increased both the concentration of sodium plus potassium and the concentration of chloride plus bicarbonate by about 50 mM. Whereas the cation change was almost exclusively one of sodium, that of the anions was preferentially an increase in chloride. For compounds with σ^A between 0 and 0.81, the concentration of sodium plus potassium was proportional to σ^A. It is concluded that the pancreas is more permeable than is the gallbladder of rabbit, fish, and bullfrog, the proximal tubule of the kidney of rat and the small intestine of bullfrog, but is probably similar to that of the small intestine of guinea pig and man.

5938 THE EFFECT OF CALCITONIN ON SECRETIN-STIMULATED PANCREATIC SECRETION IN MAN. (Eng.) Odes, H. S.; Barbezat, G. O.; Clain, J. E.; Bank, S. (Groote Schuur Hosp., Observatory, CP, 7925, South Africa). *S. Afr. Med. J.* 53(6):201-203; 1978.

The effect of a small dose of calcitonin on pancreatic secretion was studied in six healthy subjects to gain information concerning the use of calcitonin in the treatment of pancreatitis. After steady-state secretion was achieved with a constant i.v. infusion of secretin (2 µg/kg/hr), either calcitonin (0.16, and 0.32 µg/kg/hr) or 0.15 M NaCl was infused over 80 min. Calcitonin did not affect pancreatic volume output or bicarbonate concentration, but amylase concentration and output were significantly inhibited ($p<0.025$) in comparison with those in eight controls who received saline. The color index in the duodenal juice was unchanged by calcitonin. No changes were observed in blood glucose or serum calcium concentrations. The failure of calcitonin to suppress hyperamylasemia in patients undergoing endoscopic retrograde cholangiography suggests that its use in pancreatitis may be limited.

5939 INHIBITION OF PANCREATIC SECRETION BY ENKEPHALIN AND MORPHINE IN DOGS. (Eng.) Konturek, S. J.; Tasler, J.; Cieszkowski, M.; Jawarek, J.; Coy, D. H.; Schally, A. V. (Inst. Physiology, 31-531 Krakow, ul. Grzegorzecka 16, Poland). *Gastroenterology* 74(5, Part 1):851-855; 1978.

The nature and extent of enkephalin- and morphine-induced inhibition of pancreatic bicarbonate and protein secretion were studied in dogs with chronic pancreatic fistulae after administering exogenous secretin (2.0 U/kg/hr or graded doses of 0.5-8.0 U/kg/hr) or an octapeptide of cholecystokinin (0.5 µg/kg/hr) and stimulants for the endogenous release of these hormones. Both enkephalin and morphine (each at 40 µg/kg/hr) competitively inhibited the pancreatic bicarbonate secretion induced either by exogenous secretin or duodenal acidification (by 36% with secretin; by 90% and 83% by enkephalin and morphine, resp., with acidification). This inhibition was partially reversed by naloxone (20 µg/kg/hr), an opiate antagonist. Opiate substances also profoundly inhibited pancreatic protein response to the octapeptide of cholecystokinin and to various stimulants of endogenous cholecystokinin release. It is concluded that enkephalin and morphine strongly inhibit the pancreatic responses to exogenous and endogenous stimulants by a mechanism involving separate opiate receptors.

5940 EFFECT OF CHRONIC PENTAGASTRIN, CHOLECYSTOKININ, AND SECRETIN ON PANCREAS OF RATS. (Eng.) Petersen, H.; Solomon, T.; Grossman, M. I.

(Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Am. J. Physiol.* 234(3):E286-E293; 1978.

The effects of long-term treatment with pentagastrin, cholecystokinin (CCK), or secretin on pancreatic secretion in response to secretin and CCK, on the volume of endocrine and exocrine tissue in the pancreas, and on the ratio of chief cells to parietal cells in the stomach were studied in rats. Pentagastrin (1.5 mg/kg), 20% pure natural CCK (37.5 Ivy dog U/kg) or secretin (25 µg/kg) was given in a depot carrier s.c. 3 times daily for 15 days. The dose of CCK and secretin was submaximal for pancreatic secretion, whereas the dose of pentagastrin was supramaximal for gastric acid secretion. The pancreatic wet weight increased by 12% ($p<0.01$) in the rats treated with pentagastrin, 57% ($p<0.001$) in those treated with CCK, and 9% ($p<0.01$) in those treated with secretin. In CCK-treated rats, the maximal protein and bicarbonate outputs in response to CCK increased proportionately to the increase in pancreatic weight, but maximal bicarbonate and protein outputs in response to secretin were unaltered. The secretin-treated rats showed a lowered basal secretion of bicarbonate and a lowered sensitivity to secretin stimulation, but the maximal bicarbonate and protein outputs to secretin and CCK were unchanged. Pentagastrin treatment produced no significant changes in pancreatic responses to secretin or CCK. No significant difference was found between any groups for the calculated total mass of islets per pancreas. None of the treatment groups varied from the controls with respect to the ratio of chief cells to parietal cells. It is concluded that (1) the increase in pancreatic weight produced by repeated injections of cholecystokinin was accompanied by a proportional increase in functional capacity as reflected by the increased maximal bicarbonate and protein outputs in response to cholecystokinin, and (2) repeated administration of secretin decreased the sensitivity of the pancreas to secretin without altering maximal bicarbonate response.

5941 EFFECT OF SOMATOSTATIN ON EXOCRINE PANCREATIC SECRETION STIMULATED BY PANCREOZYMIN-SECRETIN OR BY A TEST MEAL IN THE DOG. (Eng.) Kayasseh, L.; Gyr, K.; Stalder, G. A.; Rittmann, W. W.; Girard, J. (Kantonsspital, CH-4004 Basel, Switzerland). *Hormone Res.* 9(3):176-184; 1978.

To determine whether somatostatin inhibits stimulated exocrine pancreatic function in dogs, exocrine pancreatic function was assessed in four animals with chronic duodenal and gastric fistulae by cannulating the pancreatic duct and collecting the duodenal contents. Pancreatic secretion was stimulated by the infusion of 2 Crick-Harper-Raper U of pancreozymin and secretin or by the administration of a liquid test meal, injected into the stomach through the gastric fistula. During both experiments, 3.5 µg/kg somatostatin was given as bolus injection followed by an infusion of 3.5 µg/kg/hr. Somatostatin caused a significant reduction in protein and amylase output and in the bicarbonate concentration during stimulation with pancreozymin-secretin ($p<0.02$, $p<0.05$, and $p<0.05$, resp.). Volume and bicarbonate were slightly decreased but not to a significant extent. Duodenal volume and the duodenal activities of trypsin and amylase were significantly reduced during test meal stimulation and somatostatin infusion ($p<0.05$, $p<0.01$, and $p<0.01$, resp.). Somatostatin is a potent inhibitor of exocrine pancreatic function, mainly influencing enzyme secretion.

5942 COMPARATIVE STUDY OF PANCREATIC SECRETION COLLECTED BY DUODENAL TUBING AND BY CATHETERISATION OF THE MAIN PANCREATIC DUCT UNDER THE SAME SECRETIN-CAERULEIN STIMULATION [Abstract]. (Eng.) Escourrou, J.; Frexinos, J.; Louis, A.; Ribet, A. (Service des Maladies de l'Appareil Digestif, C.H.U. de Rangueil, 31054 Toulouse Cedex, France). *Ir. J. Med. Sci.* 146(Suppl. 1): 44-45; 1977.

5943 TRANSPORT OF PANCREATIC ENZYMES IN THE PANCREATIC JUICE, BLOOD AND LYMPH, FOLLOWING STIMULATION OF THE PANCREATIC GLAND [Abstract]. (Eng.) Ribera, M. T.; Gramatica, L. (Hosp. San Pablo, Barcelona, Spain). *Ir. J. Med. Sci.* 146(Suppl. 1):42; 1977.

5944 PANCREATIC ALPHA-AMYLASE INHIBITORS IN CEREALS. (Eng.) Marshall, J. J. (Howard Hughes Medical Inst., Miami, FL). *Carbohydr. Res.* 57:C27-C30; 1977.

5945 PANCREATIC LIPASE EFFECTORS EXTRACTED FROM SOYBEAN MEAL. (Eng.) Widmer, F. (Res. Dept., Nestle Products Technical Assistance Co. Ltd., CH-1814 La Tour-de-Peilz, Switzerland). *J. Agr. Food Chem.* 25(5):1142-1145; 1977.

5946 THE SOURCES OF SODIUM IN RABBIT PANCREATIC JUICE. (Eng.) Galey, W. R.; Caflisch, C. R. (Univ. New Mexico Sch. Medicine, Albuquerque, NM 87131). *Proc. Soc. Exp. Biol. Med.* 156(1):35-39; 1977.

5947 THE ACTION OF BILE SALTS AND OTHER DETERGENTS ON PANCREATIC LIPASE AND THE INTERACTION WITH COLIPASE. (Eng.) Borgstrom, B. (Dept. Physical Chemistry, Univ. Lund, Lund, Sweden). *Biochim. Biophys. Acta* 488(3):381-391; 1977.

See also, 5846, 5889, 5996, 6015, 6019, 6055, 6324, 6410.

5948 PHARMACOCHOLANGIOGRAPHY. (Eng.) Burgener, F. A. (Univ. Rochester Sch. Medicine and Dentistry, Rochester, NY). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 128(2):135-137; 1978.

To improve i.v. cholangiography, the effect of ouabain and atropine on bile flow and bile iodine concentration in i.v. cholangiography was investigated in four cholecystectomized dogs with complete bile diversion under general anesthesia and compared with the effect of sodium taurocholate. Iodipamide was administered i.v. with an initial priming dose of 50 mg/kg followed by a constant infusion of 2 mg/min/kg. Ouabain in stepwise increasing infusion rates (0.0625-0.25 μg/min/kg) had no significant effect. Atropine infusion (1 to 8 μg/min/kg) increased the bile iodine concentration up to 19%, but a 14% increase with a 5% reduction in bile flow was found with the lowest atropine dose. The lowest taurocholate infusion rate (0.16 mg/min/kg) resulted in the highest bile iodine concentration and lowest bile flow. Each increment in the taurocholate infusion rate (0.32-5.12 mg/min/kg) resulted in a significant increase in bile flow when compared with the preceding value ($p<0.05$). It is suggested that atropine premedication and low bile salt plasma levels might improve the opacification of the biliary tree, particularly in hepatic dysfunction by selectively reducing specific fractions of the basal bile flow.

5949 UPTAKE OF MACROMOLECULES BY RAT KUPFFER CELLS IN VITRO. (Eng.) Munthe-Kaas, A. C. (Norwegian Radium Hosp., Montebello, Oslo 3, Norway). *Exp. Cell Res.* 107(1):55-62; 1977.

Studies were carried out to determine whether pinocytosis plays a significant role in the normal physiology of the liver macrophage. Pinocytosis was studied in cultured rat Kupffer cells by using colloidal ^{198}Au, ^{131}I-labeled serum albumin, and ^{3}H-labeled sucrose as test substances. The kinetics of uptake as well as electron microscopy indicated that colloidal gold was pinocytosed directly as part of the fluid medium without prior absorption to the cell membrane. This process was resistant to cytochalasin B (CB), colchicine, and metabolic inhibitors at concentrations where phagocytosis would have been totally inhibited, but was reduced to less than 10% by low temperature. These data suggest that colloidal gold was taken up by micropinocytosis. Serum showed an inhibitory effect on colloidal gold and albumin uptake, whereas it stimulated sucrose uptake. Sucrose uptake was also more sensitive to CB. Distinct processes of macropinocytosis and micropinocytosis, with separate control mechanisms, may be occurring simultaneously in these cells.

5950 ULTRASTRUCTURE OF ADULT RAT HEPATOCYTES CULTURED ON FLOATING COLLAGEN MEMBRANES. (Eng.) Sattler, C. A.; Michalopoulos, G.; Sattler, G. L.; Pitot, H. C. (Duke Univ. Sch. Medicine, Durham, NC). *Cancer Res.* 38(6):1539-1549; 1978.

The ultrastructure of primary hepatocytes cultured for 2 to 17 days on floating collagen membranes was evaluated to test the value of this new technique for long-term culturing. A pellet of the hepatic cell suspension used to inoculate the collagen membranes contained some single cells and many aggregates of two, three, or four cells. Desmosomes were split during the perfusion, but tight junctions and gap junctions remained intact. By 2 days in culture, the hepatocytes had formed a monolayer of cells of polygonal shape with newly synthesized desmosomes between cells. Since the flexible floating collagen membrane decreases in size as the monolayer forms, the hepatocytes do not flatten out, as is characteristic of cells cultured on a rigid substrate. Hepatocytes in culture for 10 days or less exhibited large lamellar arrays of rough endoplasmic reticulum, well developed Golgi complexes, and structures resembling bile canaliculi, which possess tight junctions and desmosomes separating them from the intercellular space. Microfilaments oriented parallel to the plasma membranes of adjoining cells and in an intermeshed network at the edge of the monolayer and beneath the plasma membrane bordering the medium increased in size and number in older cultures. After 17 days in culture, the cells maintained tight junctions, desmosomes, Golgi complexes, and rough endoplasmic reticulum in small lamellar stacks and in small vesicles. Since hepatocytes on the floating collagen membrane retain most of the subcellular structural elements characteristic of normally functioning hepatocytes for 2.5 weeks, this system may be valuable for future experiments involving drug metabolism and carcinogenesis *in vitro*.

5951 LIVER ORIGIN OF HEPATOTROPHIC FACTOR(S). (Eng.) Demetriou, A. A.; Levenson, S. M. (Vanderbilt Univ. Sch. Medicine, Nashville, TN). *Surg. Forum* 28:383-384; 1977.

The hypothesis that the liver remnant following 70% hepatectomy is the site of production of a hepatotrophic factor(s) was tested. The effect of "conditioned tissue culture media" on the growth of hepatocytes *in vitro* was tested. Conditioned media refers to media in which cells have been grown in culture and then removed; the media is then used to cultivate other cells and the growth rate is assessed. At various time intervals following either hepatectomy or sham operation in male Sprague-Dawley rats, the media from normal hepatocytes were substituted with conditioned media from other hepatocyte monolayer cultures derived from normal, sham-hepatectomized, and 70% hepatectomized rats. Eight hours following media substitution, tritiated thymidine was added for 60 min. Twelve-hour conditioned media from regenerating liver cells produced a significant ($p<0.001$) stim-

ulation of tritiated thymidine incorporation into the DNA of normal hepatocytes in culture, whereas media conditioned with normal or sham-hepatectomy rat liver cells had no significant effect. Twelve-hour conditioned media from regenerating liver cells, when added to normal hepatocyte cultures, produced significant ($p<0.001$) stimulation of ornithine decarboxylase activity 4 hr later. These studies suggest that the hepatocytes derived from the regenerating liver remnant secrete a factor(s) into the culture medium that produces stimulation of the rate of thymidine incorporation into DNA.

5952 INTEGRATED STEREOLOGICAL AND BIOCHEMICAL STUDIES ON HEPATOCYTIC MEMBRANES. I. MEMBRANE RECOVERIES IN SUBCELLULAR FRACTIONS. (Eng.) Bolender, R. P.; Paumgartner, D.; Losa, G.; Muellener, D.; Weibel, E. R. (Dept. Biological Structure, Univ. Washington, Seattle, WA 98195). *J. Cell Biol.* 77(2):565-583; 1978.

A stereological study was undertaken to estimate membrane surface areas in the intact tissue, homogenate, and fractions of the same rat livers and then to test the comparability of these data with membrane marker enzymes by calculating both morphological and biochemical recoveries. The stereological data were corrected for errors due to section thickness and compression. The average total membrane surface area per gram of liver was 9.3 m^2 in the intact tissue (T), 7.8 m^2 in the homogenate (H), and 7.4 m^2 in the fractions (F); recoveries for the membrane surface areas thus averaged 96% for the (F/H) and 81% for the (F/T) comparisons. In homogenate and fractions, the differentiability of membranes by morphological criteria was limited to rough- and smooth-surfaced membranes, as well as outer and inner mitochondrial membranes. The recoveries of rough-surfaced membranes were 101% for F/H and 92% for F/T; those of smooth-surfaced membranes were 89% for F/H and 107% for F/T. For mitochondrial membranes, a recovery of 100% for F/H was obtained, whereas it amounted to only 54% for F/T. With respect to F/H, the membrane recoveries compare well with the marker enzyme recoveries obtained biochemically. The extension of recovery calculations to the intact tissue (F/T) revealed satisfactory conservation of the procedures of homogenization and fractionation; it indicates, however, that a shift of a substantial part of mitochondrial membranes to the pool of unidentifiable smooth membranes may occur on homogenization.

5953 TECHNIQUES FOR ASSESSMENT OF BILIARY EXCRETION AND ENTEROHEPATIC CIRCULATION IN THE RAT. (Eng.) Johnson, P.; Rising, P. A. (Hoechst Pharmaceutical Res. Lab., Walton Manor, Walton, Milton Keynes MK7 7AJ, England). *Xenobiotica* 8(1): 27-36; 1978.

Surgical cannulation of the bile duct of rats (Charles River, Sprague-Dawley, CD, and Wistar) was performed to permit analysis of compounds excreted in the bile, and a modification of the procedure is also described for assessment of the reabsorption and recirculation of biliary excreted compounds. The bile duct was cannulated proximal to the liver (approximately 2 cm) to prevent admixture of pancreatic juice with the bile, which was continuously collected in a glass vessel inserted into the peritoneal cavity. After at least 16 hr, with addition of glucose to the drinking water and communal housing, the rats recovered, i.e., their activity, food and fluid intake, and defecation were normal. It was determined that 6-10 ml bile/100 g body weight/24 hr should be collected when the procedure is successful. The four ^{14}C-labeled compounds (Fendosal, Isoxepac, C 72 0045, and HP 505) that were administered p.o. and i.p. in various doses to test the efficacy of the method were recovered at rate of >95% in all but a single case. Bile may be collected for up to 6 days after dosing. For use of the procedure to determine enterohepatic recirculation, a second cannula was used to infuse bile collected from a donor rat into the duodenum. Poor recoveries in total reactivity were attributed to the use of a restraining cage, which was deemed inadequate for collection of urine and feces; however, calculations are presented that allow good agreement between experimental values and values for combined biliary/urinary reabsorption. The specific metabolic distribution before and after recirculation was determined by thin-layer chromatography. This technique of assessing biliary excretion and recirculation is quick, simple, gives a comprehensive profile, and has the major advantage of maintaining nearly normal experimental conditions because the rats remain mobile after the operation.

5954 LIVER SUPPORT SYSTEMS: THE LOW CLEARANCE OF MODEL HEPATIC EXCRETORY ANIONS BY CHARCOAL HEMOPERFUSION. (Eng.) Hew, J. T.; Hart, F. E.; Willson, R. A. (Div. Gastroenterology, Univ. Washington, Seattle, WA). *Gastroenterology* 74(4): 661-663; 1978.

Because the adsorptive properties of charcoal are complex and its systematic evaluation for the removal of model compounds from plasma is not complete, the clearance of strongly protein-bound cholephilic anions was assessed by measuring the removal of unconjugated bilirubin, BSP, and indocyanine green (ICG) by charcoal hemoperfusion in normal dogs. None of these model excretory compounds was effectively removed by the charcoal columns. *In vitro* studies of BSP and ICG suggested that poor removal of the anions was related to albumin binding in that, when the anions were in molecular solution, their extraction by the charcoal column was high (extraction ratios of 0.92 and 0.79, resp.), whereas, when albumin was added, their extraction was negligible (extraction ratios of 0.06 and 0.10, resp.). Therefore, if the removal from plasma of strongly bound toxins is important in the treatment of acute hepatic failure, additional support devices may have to be encompassed into the ultimately successful hepatic support system.

5955 LACTATE-STIMULATED ETHANOL OXIDATION IN ISOLATED RAT HEPATOCYTES. (Eng.) Crow, K. E.; Cornell, N. W.; Veech, R. L. (Dept. Chemistry, Biochemistry, and Physics, Massey Univ., Palmerston North, New Zealand). *Biochem. J.* 172(1):29-36; 1978.

The mechanism of lactate stimulation of ethanol oxidation was investigated. Hepatocytes isolated from starved rats and incubated without other substrates oxidized ethanol at a rate of 0.8-0.9 μmol/min/g wet weight of cells. Addition of 10 mM lactate increased this rate twofold. Quinolinate (5 mM) or tryptophan (1 mM) decreased the rate of gluconeogenesis with 10 mM lactate and 8 mM ethanol from 0.39 to 0.04-0.08 μmol/min/g wet weight of cells, but rates of ethanol oxidation were not decreased. It appears that acceleration of ethanol oxidation by lactate is not dependent upon the stimulation of gluconeogenesis and the consequent increased demand for ATP. As another test of the relationship between ethanol oxidation and gluconeogenesis, the initial lactate concentration was varied from 0.5 mM to 10 mM, and pyruvate was added to give an initial [lactate]/[pyruvate] ratio of 10. This substrate combination gave a large stimulation of ethanol oxidation (from 0.8 to 2.6 μmol/min/g wet weight of cells) at low lactate concentrations (0.5-2.0 mM), but rates remained nearly constant (2.6-3.0 μmol/min/g wet weight of cells) at higher lactate concentrations (2.0-10 mM). In contrast, owing to the presence of ethanol, the rate of glucose synthesis was only slightly increased (from 0.08 to 0.12 μmol/min/g wet weight of cells) between 0.5 mM and 2.0 mM lactate and continued to increase (from 0.12 to 0.65 μmol/min/g wet weight of cells) with lactate concentrations between 2 and 10 mM. In the presence of ethanol, O_2 uptake increased with increasing substrate concentration over the entire range. Changes in concentrations of glutamate and 2-oxoglutarate closely paralleled changes in the rate of ethanol oxidation. In isolated hepatocytes, rates of ethanol oxidation are lower than those *in vivo*, apparently because of depletion of malate-aspartate shuttle intermediates during cell preparation. Rates are returned to those observed *in vivo* by substrates that increase the intracellular concentration of shuttle metabolites.

5956 ENDOGENOUS AND EXOGENOUS HEPTADECAPEPTIDE GASTRIN TRANSPORT ACROSS THE PIG LIVER. (Eng.) Vinik, A. I.; Hickman, R.; Grant, B. J. (Dept. Medicine, Univ. Cape Town, Cape Town, South Africa). *S. Afr. Med. J.* 53(19):759-765; 1978.

Gastrin transport across the pig liver was studied in the basal unstimulated state and after infusions of exogenous synthetic human gastrin. *In vivo* studies showed no net loss or gain of endogenous porcine gastrin during transport across the liver in fasting animals. Infusion of synthetic human heptadecapeptide gastrin (G-17, 0.25, 0.5, and 1.0 μg/kg/min) raised circulating gastrin levels to those found in the postprandial state. At no time was there a loss or gain of immunologically determined gastrin across the liver. Changes in the molecular size of gastrin, however, suggest that qualitative but not quantitative effects followed the administration of G-17 *in vivo*. The disappearance of gastrin from the circulation was biphasic, with an initial half-life of 3 min and a slower phase suggesting recirculation or multicompartment equilibration. The distribution at equilibrium was ±20% of body weight calculated from arterial levels, but 30-40% if portal or hepatic venous values were used. The mean blood production rate was ±125 μg/day, but the portal contribution was only 30 μg/day, suggesting an important alternative source of gastrin. It is concluded that the liver plays an unimportant role in the inactivation of immunoreactive G-17 gastrin.

5957 REGULATION OF HEPATIC SYNTHESIS OF PROTEINS BY THE CHRONOLOGY OF PROTEIN INGESTION. (Eng.) Lardeux, B.; Bourdel, G.; Girard-Globa, A. (Centre de Recherches sur la Nutrition du C.N.R.S., 9, rue Jules Hetzel, 92 190 Meudon-Bellevue, France). *Biochim. Biophys. Acta* 518(1):113-124; 1978.

To assess the direct influence of protein ingestion on protein synthesis, circadian variations in liver protein synthesis were assessed in control rats fed a mixed 10% protein diet and in rats fed proteins as a separate meal either at 09:00 (SF 09) or at 21:00 (SF 21) and provided with a protein-free diet *ad libitum*. Protein synthesis was measured by incorporation of labeled leucine over 15 min at timepoints regularly spaced over 24 hr. In controls, the circadian variations observed were of moderate amplitude (from 2.75 mg/hr/g at 09:00 to 5.77 mg/hr/g at 06:00) and correlated with increased protein and RNA contents of the liver. In separately fed animals, ingestion of the protein meal triggered a 300% increase in protein synthesis within 1 hr while the feeding pattern was unaltered. In the SF 09 group, high synthetic activity was not followed by an increase of hepatic protein content, while hepatic urea concentrations were sharply increased (40-100% above the 24-hr mean) and glucogenic amino acid pools were greatly depleted (-25% at 0.5 hr after the meal). It is suggested that the high influx of amino acids consecutive to the absorption of the dietary proteins is the key factor stimulating protein synthesis, while synchronization with the energetic metabolism controls the degree of degradation.

5958 REPLACEMENT OF THE EXTRAHEPATIC COMMON BILE DUCT IN THE DOG BY AN ELASTOMERE SILICONE PROSTHESIS: POSSIBLE APPLICATIONS IN BILIARY SURGERY. (Fre.) Kron, B. (Clinique Chirurgicale de Sartrouville, 20, avenue Maurice-Bertreau, 78500 Sartrouville, France). *J. Chir. (Paris)* 114(4):237-256; 1977.

A method of replacing the common bile duct with a silicone elastomere prosthesis was studied in 21 dogs. A sutureless, double intubation technique was used to replace a 4-cm length of the common

bile duct with the silicone tube. One postoperative death was caused by the intraperitoneal migration of the prosthesis. The other animals remained in excellent health with no signs of hepatic or biliary dysfunction for up to 2.5 years, except for two dogs who showed severe digestive problems 3 and 6 months after surgery, resp. Autopsies showed minimal hepatic lesions in one dog and a beginning cirrhosis in the other. Radiological and biological parameters were normal in all but the latter two dogs and one other with a dilatation of the common bile duct. The prosthesis could be easily removed after 6 months by a simple short choledochotomy, leaving a patent, permeable neocholedochus with excellent function. These good results suggest the use of this prosthesis in man for stenosis or operative wounds of the bile ducts, using either a removable tutor prosthesis or a segmental prosthesis lost internally. In palliative surgery for biliary carcinoma, the prosthesis can bypass the diseased ducts and be implanted in the stomach, duodenum, or jejunum; it is eliminated internally. It should also be possible to use a silicone prosthesis in certain cases of congenital bile duct abnormalities.

5959 EFFECT OF AGING ON BILIARY LIPID COMPOSITION AND BILE ACID METABOLISM IN NORMAL CHILEAN WOMEN. (Eng.) Valdivieso, V.; Palma, R.; Wunkhaus, R.; Antezana, C.; Severin, C.; Contreras, A. (Universidad Catolica de Chile, Escuela de Medicina, Marcoleta 347, Santiago, Chile). *Gastroenterology* 74(5, Part 1):871-874; 1978.

To determine the effects of age and of obesity on biliary lipid composition and bile acid metabolism, biliary lipid composition was determined in fasting gallbladder bile of 12 young (16-25 yr) and 12 elderly (>50 yr) asymptomatic Chilean women with normal weights and recent, normal cholecystograms and in four elderly, obese women with radiologically normal gallbladders. The proportion of biliary cholesterol and the lithogenic index were significantly higher in the 12 asymptomatic elderly women of normal weight than in the young women (6.9 ± 1.8% versus 10.6 ± 2.9% cholesterol, $p<0.001$; lithogenic index 0.72 ± 0.19 versus 1.07 ± 0.28, $p<0.001$). Moreover, supersaturated bile was present in 8.3% of the young and in 41.7% of the older women studied. Obesity was found to enhance the saturation of bile in older females: lithogenic bile was found in all four elderly, obese women. The bile acid pool and cholic acid metabolism were studied in five young and four older normal women. Both groups showed similar values of bile acid pool, cholic acid synthesis, and turnover. These results indicate that aging *per se* modifies the proportions of biliary lipids in Chilean women, and provide a partial explanation for the frequency of gallstones observed among them. The increment in the lithogenic index of gallbladder bile with age takes place without significant changes in bile acid metabolism, suggesting that the canalicular secretion of cholesterol increases with aging.

5960 THE HEPATOTOXICITY OF 3-AMINO-1,2,4-TRIAZOLE AND CARBON DISULPHIDE IN PHENOBARBITONE-TREATED STARVED RATS. (Eng.) Magos, L.; Butler, W. H.; Snowden, R. (Medical Res. Council Toxicology Unit, Carshalton, Surrey, England). *Toxicology* 9(1/2):103-107; 1978.

Experiments were carried out in phenobarbitone-treated Porton-Wistar rats to determine if aminotriazole is hepatotoxic in phenobarbitone-induced animals, and to see whether, under the same experimental condition, it interferes with the hepatotoxic effect of CS_2. In phenobarbitone-treated (80 and 50 mg/kg at 0 and 6 hr, resp., i.p.) starved male Porton-Wistar albino rats, 3-amino-1,2,4-triazole (1 g/kg, i.p.) produced moderate liver necrosis and increased the SGPT activity. If the animals were exposed for 4 hr to 2.0 mg/l CS_2, beginning 0.5 hr after aminotriazole administration, the necrotic damage in the liver was larger and the SGPT activity higher than in rats not exposed to CS_2 ($p<0.001$). CS_2 in phenobarbitone-treated starved male rats caused only a very slight increase in the serum transaminase activity in spite of the widespread hydropic degeneration in the liver. These experiments indicate that an increase in serum transaminase activity is the consequence of necrosis and not of hydropic degeneration; aminotriazole is hepatotoxic in rats when microsomal enzymes are induced, and the separate hepatotoxicities of aminotriazole and of carbon disulfide are potentiated by the administration of the other compound.

5961 EFFECTS OF AUREOMYCIN ON BILE ACIDS IN RATS. (Eng.) Madsen, D. C.; Wostmann, B. S.; Beaver, M.; Chang, L. (Lobund Lab., Univ. Notre Dame, Notre Dame, IN 46556). *J. Lab. Clin. Med.* 91(4):605-611; 1978.

To study the effect of antibiotics on the extent to which bile acids (BAs) are altered by bacteria, rats were treated for 5 days with low levels of Aureomycin (0.85 μM) in the drinking water. This treatment led to a predominance of ω-muricholic acid (ω-MC) over hyodeoxycholic acid (HDC) in the feces at 10 days after withdrawal of the antibiotic. This reduced the usual HDC/ω-MC ratio from approximately 2.0 to 0.9 or less. These rats were also found to have liver cholesterol levels modestly elevated over those of controls. In other experiments, the decrease in the HDC/ω-MC ratio was found to persist for at least 90 days after discontinuation of treatment. Later experiments carried out with Aureomycin and with penicillin revealed the possible existence of a resistance factor to Aureomycin. A significant lowering of the HDC/ω-MC ratio was now found only with antibiotic concentrations 10 to 100 times greater than those used previously. Possible implications of the persistence of antibiotic effects, as measured by changes in fecal BAs, include effects on vitamin metabolism, colon cancer, and cholesterol metabolism.

5962 THE EFFECT OF ADDED BRAN TO THE DIET ON THE SATURATION OF BILE IN PEOPLE WITHOUT GALLSTONES. (Eng.) Watts, J. McK.; Jablonski, P.; Toouli, J. (Flinders Medical Center, Bedford Park,

South Australia 5042, Australia). *Am. J. Surg.* 135 (3):321-324; 1978.

To determine whether an increase in dietary fiber may create conditions in the biliary tract in which gallstones are less likely to form, bran was added to the diet of 11 volunteers without gallstones, and its effect on bile saturation, bile acid profile in bile, and serum cholesterol and triglycerides was determined. Bile cholesterol saturation was decreased after 2 months of feeding bran to those five women who had supersaturated bile (i.e., ≥1 saturation index). Bran may be effective in decreasing the lithogenic potential of bile in people without gallstones, and further studies on its place in the prevention of gallstones in susceptible individuals are indicated.

5963 REVERSAL OF CLOFIBRATE-INDUCED CHOLESTEROL OVERSATURATION OF BILE WITH CHENODEOXYCHOLIC ACID. (Eng.) Bateson, M. C.; Ross, P. E.; Murison, J.; Bouchier, I. A. D. (Ninewells Hosp. and Medical Sch., Dundee DD1 9SY, Scotland). *Br. Med. J.* 1(6121):1171-1173; 1978.

Studies were carried out to assess whether the increase in biliary cholesterol induced by clofibrate is sustained and, if so, whether it can be reversed by chenodeoxycholic acid (CDCA) without any deterioration in the control of hyperlipemia. Giving clofibrate (2 g/day) to seven patients significantly increased the biliary cholesterol concentration ($p<0.05$) while the proportion of bile acids fell. Five patients on established clofibrate treatment were given 750 mg of CDCA daily for 1 month. Biliary lipid analysis after the CDCA treatment showed a significant fall in the proportion of cholesterol ($p<0.025$) and a rise in that of bile acids ($p<0.01$). The serum lipid concentrations, which had already been reduced by diet and clofibrate, showed a further significant reduction after the introduction of CDCA. This study suggests that CDCA may be usefully combined with clofibrate to reverse the tendency towards cholesterol saturation of bile and enhance the effect of lowering serum lipid concentrations.

5964 LIVER DAMAGE IN RABBITS FROM ADMINISTRATION OF A SINGLE DOSE OF GRAM-NEGATIVE ENDOTOXIN. (Eng.) Aballi, A. J.; Karayalcin, G.; Costales, F.; Gubernick, I.; Lanzkowsky, P. (Long Island Jewish-Hillside Medical Center, New Hyde Park, NY 11040). *Pediatr. Res.* 12(5):646-651; 1978.

The effect of a preparatory dose of gram-negative endotoxin on the liver was investigated, since hepatic pathology may explain some disturbances produced by endotoxin. Sixteen adult male New Zealand rabbits had initial liver biopsies, blood chemistries, and coagulation studies and were then divided into two groups: group I (10 animals) received 50 μg/kg endotoxin from *Escherichia coli* 0111B4; group II (6 animals) served as controls and received no endotoxin. In group I, all animals developed increased levels of LDH isoenzyme 5 and SGOT and decreased serum albumin levels. A rise in the level of SGPT and 5'-nucleotidase occurred in most rabbits. LDH isoenzyme 5 values increased from 3.6 ± 5.83 mU/ml before to 180.4 ± 142.11 mU/ml after endotoxin ($p<0.005$). SGOT levels rose from 28.90 ± 8.87 mU/ml to 241.10 ± 104.76 mU/ml ($p<0.001$). Serum albumin levels decreased from 3.78 ± 0.31 g/dl to 3.21 ± 0.32 g/dl ($p<0.001$). SGPT levels initially showed a level of 41.00 ± 6.97 mU/ml, which rose to 94.40 ± 19.60 mU/ml ($p<0.001$). 5'-Nucleotidase levels rose from 1.48 ± 0.69 mU/ml to 6.01 ± 4.51 mU/ml ($p<0.01$). The animals also had changes in coagulation tests, with a decrease in factors II and V. Factor II was 77.4 ± 11.82% before and 38.70 ± 7.47% after endotoxin ($p<0.001$). Factor V values were 95.00 ± 9.04% before and 50.6 ± 7.5% after endotoxin ($p<0.001$). Changes in fibrinogen and factor VIII levels were not significant. Split products of fibrinogen showed a slight increase. Definite hepatic necrosis consisting of scattered patchy areas of variable size and severity was found in 7 of the 10 animals. In many of these areas of necrosis, a polymorphonuclear leukocyte reaction and a few small thrombi were detectable. The liver biopsies performed before endotoxin administration failed to show any evidence of hepatic involvement. Group II controls showed no indications of abnormal liver function and no evidence of hepatic necrosis. These studies indicate that significant hepatic changes occur after the administration of a single dose of endotoxin given in preparation for the Shwartzman reaction.

5965 EFFECT OF SINUSOIDAL PERFUSION ON GALACTOSE ELIMINATION KINETICS IN PERFUSED RAT LIVER. (Eng.) Keiding, S.; Chiarantini, E. (Rigshospitalet, Copenhagen, Denmark). *J. Pharmacol. Exp. Ther.* 205(2):465-470; 1978.

A model that assumes the elimination of substrates from the blood by the intact liver to take place at a sinusoidal concentration decreasing along the flow (sinusoidal perfusion model) was evaluated and compared with an earlier approach assuming the elimination to take place at the outflow concentration. Ten livers from female Wistar rats (average weight, 200 g) were perfused in a recirculating system. The rats had been starved for 18 hr prior to perfusion and a constant galactose elimination rate was ensured by constant galactose infusion. Each experiment consisted of three steady-state periods with a blood flow of 15, 9, and 15 ml/min, resp. The sinusoidal perfusion model predicts that reduction of flow at a given elimination rate will reduce hepatic outflow concentration, in contrast to the other model that predicts the outflow concentration to be constant. According to the sinusoidal perfusion model, the logarithmic average concentration ($\hat{c}$) is independent of flow at a given elimination rate; $\hat{c}=(c_i-c_o)/\ln(c_i/c_o)$, where c_i is the inflow concentration and c_o the outflow concentration. There was a significantly lower outflow concentration during the period with low flow than during periods with high flow ($p<0.01$), whereas the logarithmic average concentration was not changed. These observations are consistent with the sinusoidal perfusion model but do not comply with the

earlier proposed use of the outflow concentration as an approximation to the sinusoidal concentration.

5966 BIOACTIVATION AND COVALENT BINDING OF HALOTHANE TO LIVER MACROMOLECULES. (Eng.) Sipes, I. G.; Podolsky, T. L.; Brown, B. R., Jr. (Health Sciences Center, Univ. Arizona, Tucson, AZ 85724). *Environ. Health Perspect.* 21:171-178; 1977.

Studies were carried out in rats to determine if ^{14}C-halothane or its metabolites interact with DNA. Three bioactivation systems were used: *in vitro* microsomal incubations, isolated hepatocytes, and *in vivo* administration. Even though optimal conditions for bioactivation were used, no significant covalent binding of ^{14}C to DNA was observed. Slight ^{14}C activity above background (6 disintegrations/min/0.1 mg DNA) was observed in the microsomal incubations but was considered insignificant because it was not reduced when NADPH was omitted from the incubations. Covalent binding to nuclear lipids and proteins was observed when rats were pretreated with phenobarbital and maintained in a hypoxic environment (14% O_2). Similarly, these conditions markedly increased covalent binding of ^{14}C from ^{14}C-halothane to microsomal proteins and lipids. Isolated rat hepatocytes proved to be a viable system for studying the bioactivation of halothane. In this system it was also possible to demonstrate increased binding under N_2 and/or phenobarbital pretreatment.

5967 HALOTHANE HEPATOTOXICITY AND THE REDUCED DERIVATIVE, 1,1,1-TRIFLUORO-2-CHLOROETHANE. (Eng.) Brown, B. R., Jr.; Sipes, I. G.; Baker, R. K. (Univ. Arizona Coll. Medicine, Tucson, AZ 85724). *Environ. Health Perspect.* 21:185-188; 1977.

Studies were carried out to investigate the mechanism by which 1,1,1-trifluoro-2-bromo-2-chloroethane (halothane) produces hepatic necrosis. Since the bonding energy of the bromine atom in halothane is known to be relatively weak, the possibility that an enzymatic reductive attack could occur at this site was investigated by synthesizing and studying the hepatotoxic potential of the reduced, debrominated product of halothane, 1,1,1-trifluoro-2-chloroethane. The derivative was unstable and thus was prepared anaerobically and trapped in propylene glycol solvent. Approximately 1 mg of 1,1,1-trifluoro-2-chloroethane in 0.5 ml solvent was injected into the portal vein of male Sprague-Dawley rats under pentobarbital anesthesia (25 mg/kg). The rats were sacrificed 24 hr later. This treatment produced extensive liver necrosis, whereas treatment with the vehicle alone was innocuous. It is postulated that biotransformation of halothane via a reductive pathway could produce this reactive intermediate metabolite, resulting in the hepatotoxicity of this anesthetic.

5968 BILE FLOW AND BILIARY EXCRETION RATE OF SOME ORGANIC ANIONS IN PHENOBARBITAL-PRETREATED RATS. (Eng.) Fischer, E.; Varga, F.; Gregus, Z.; Gogl, A. (Univ. Medical Sch. Pecs, Szigeti u. 12, H-7643 Pecs, Hungary). *Digestion* 17(3):211-220; 1978.

To gain more information on the correlation between the choleretic effect and the increased biliary excretion in phenobarbital-pretreated rats, bile flow and the biliary excretion of indocyanine green, bromcresol green, eosine, BSP-glutathione conjugate (BSP-GSH), amaranth, and iodoxamic acid were investigated in control and phenobarbital-pretreated rats (75 mg/kg/day, i.p., for 5 days). The bile flow was increased by phenobarbital from an average of 50.6 to 77.7 µl/kg/min. Depending on the dose, the biliary excretion rate of bromcresol green was increased by 48-496% and that of eosine by 30-149%. After phenobarbital pretreatment, the excretion of BSP-GSH was also enchanced by 34-52%, that of amaranth by 37-53%, and that of iodoxamic acid by 40-56%. However, the biliary excretion of indocyanine green remained unchanged. There was no parallelism between the increase in bile flow and biliary excretion of the drugs.

5969 CHOLESTEROL IN ACUTE CHOLESTASIS INDUCED BY TAUROLITHOCHOLIC ACID: A CYTOCHEMICAL STUDY IN TRANSMISSION AND SCANNING ELECTRON MICROSCOPY. (Eng.) Bonvicini, F.; Gautier, A.; Gardiol, D.; Borel, G. A. (Istituto di Patologia Speciale Medica, Universita degli Studi di Chieti, I-60100 Chieti, Italy). *Lab. Invest.* 38(4):487-495; 1978.

Studies were carried out to verify that ultrastructural changes of taurolithocholic acid-induced cholestasis are similar to those in cholestasis produced by other bile acids or their sodium salts and to correlate chronologically these modifications with the variations in bile flow. In addition, attempts were made to determine the cytochemical nature of the substances responsible for the development of these crystalline structures, with particular emphasis on the role of free cholesterol in this process. Rats were each given a single i.v. dose of sodium taurolithocholate (100 mg/kg), and an almost total cholestasis appeared after 10 min and lasted for 3 hr after the injection; then choleresis began again, and 24 hr after the injection, normal values of bile flow were restored. Ultrastructural analysis of the liver during the acute cholestasis and the restoration phase showed, beside usual modifications found in most cases of cholestasis, the "characteristic" alterations of sodium taurolithocholate-induced cholestasis. After Williamson's reaction procedure, not only were cholesterol-digitonin complexes found in large numbers both in the hepatocytic cytoplasm and in the biliary canaliculi, but also their morphologic appearance revealed several new features: dark sticks and dark lamellae, frequently adsorbed on the outer surface of crystalline clear material, were observed by transmission electron microscopy and plugs, obliterating parts of biliary canaliculi, were observed using scanning electron microscopy. These observations seem to indicate that a significant amount of free cholesterol is released into

the hepatocyte cytoplasm and into canalicular lumina within a few minutes after the injection of sodium taurolithocholate, probably originating from the hepatocytic membranes, especially from those limiting the canalicular lumen. Such a drastic modification in the chemical constitution of these membranes should coincide with a marked modification of their active and passive transport ability.

5970 FATTY LIVER IN HYPERVITAMINOSIS A: SYNTHESIS AND RELEASE OF HEPATIC TRIGLYCERIDES. (Eng.) Singh, M.; Singh, V. N. (Vallabhbhai Patel Chest Inst., Univ. Delhi, Delhi, 110007 India). *Am. J. Physiol.* 234(5):E511-E514; 1978.

Studies were carried out in rats to determine the effect of excessive vitamin A intake on hepatic triglyceride secretion into plasma. Feeding large doses (30,000 IU/100 g body weight/day) of vitamin A to young rats for 2 days produced fatty liver, caused a stimulation of oxidation ($p<0.001$) and esterification ($p<0.01$) of [1-^{14}C]palmitate by liver slices, and increased the activity of hepatic palmitoyl-coenzyme A synthetase ($p<0.01$). Under similar conditions, however, release of hepatic triglycerides into the plasma, as judged from the post-Triton triglyceridemia, remained unaffected. These findings indicate that excessive vitamin A intake produces fatty liver by stimulating the synthesis of triglycerides in liver without affecting the rate of secretion of hepatic triglycerides. An involvement of altered oxidation of fatty acids in the liver can also be ruled out, because, in hypervitaminosis A, this process is increased rather than decreased as required for fatty liver production.

5971 IMPROVED HEPATIC FUNCTION AND SURVIVAL WITH ADENOSINE TRIPHOSPHATE-MAGNESIUM CHLORIDE AFTER HEPATIC ISCHEMIA. (Eng.) Hirasawa, H.; Chaudry, I. H.; Baue, A. E. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Surgery* 83(6):655-662; 1978.

The effect of infusion of ATP-$MgCl_2$ after 60 or 90 min of total hepatic ischemia was studied, since previous work had shown a protective effect of the administration of this complex in postischemic acute renal failure and shock. Following the release of the hepatic vascular occlusion, ATP-$MgCl_2$, ATP alone, or $MgCl_2$ alone (0.25 ml, 12.5 μmol each) was given i.v. to treated animals, and saline (0.25 ml) was given to the controls. Survival was measured over a period of 5 days. The survival rate after 60 and 90 min of ischemia was 87.5% and 69.2% in the ATP-$MgCl_2$-treated animals and 43.8% and 23.1% ($p<0.01$ at 60 min and $p<0.02$ at 90 min) in the control group, resp. When either ATP or $MgCl_2$ alone was given after 60 min of hepatic ischemia, the survival rate was 20% and 30%, resp. In another group of animals, serum enzyme and hepatic ATP levels were measured 1 hr following the release of 60 min of ischemia. SGOT and SGPT levels were greatly increased following ischemia (1,976 ± 176 and 1,141 ± 111 IU/l, resp., after 60 min of ischemia), and the levels of these enzymes were significantly lowered (729 ± 96 and 520 ± 127 IU/l, resp., $p<0.001$) with ATP-$MgCl_2$ treatment. Hepatic cellular ATP levels and energy charge were significantly decreased during occlusion (1.20 ± 0.11 μmol/g); however, ATP levels were increased (1.87 ± 0.1, $p<0.001$) and the energy charge returned to normal following ATP-$MgCl_2$ treatment. Thus, increased survival and improved hepatic function after ischemia were associated with elevated cellular ATP levels following ATP-$MgCl_2$ administration. While the precise mechanism of action of ATP-$MgCl_2$ remains unknown, these observations may have important implications for future use in organ preservation, management of postischemic acute hepatic failure, and multiple systems failure.

5972 POLYVINYLCHLORIDE (PVC) PARTICLES IMPLANTATION IN MOUSE LIVER. A TECHNIQUE FOR EXPERIMENTAL STUDY OF SCHISTOSOME EGGS-INDUCED LIVER PATHOLOGY. (Eng.) Joky, A.; Cornu, M.; Louis, D.; Grimaud, J. A. (Centre de Microscopie Electronique et de Pathologie Ultrastructurale, Institut Pasteur, 77, rue Pasteur, F-69265 Lyon, France). *Experientia* 34(4):547-549; 1978.

To study the cellular changes of the portal tract produced by foreign body granuloma and the consequent hepatic vascular bed modifications, a model system was developed using intrahepatic implantation of polyvinylchloride (PVC) particles in Swiss albino mice. Five control mice, 10 mice injected into the cecal vein with PVC particles (about 20,000 particles each 110 ± 30 μm in diameter and 1.4 in density), and 5 mice infested with cercariae of *Schistosoma mansoni* were examined 8 days after injection or 8 weeks after cercarial exposure by light and electron microscopy and by the preparation of plastic casts of the portal system. The plastic casts revealed a marked decrease in the number of small injected veins and a sudden reduction in the diameter of the medium and small portal veins in the PVC-injected livers that was also apparent in the schistosome-infested livers as compared with the normal controls. Light microscopy revealed a granulomatous reaction around the PVC particles, and electron microscopy of periparticular granulomatous areas showed numerous macrophages and giant cells in contact with the PVC particles, and a lymphoplasmocytic, granulocytic, and fibroblastic infiltration was also evident. This technique produces changes in the intrahepatic portal system similar to those seen in human and murine schistosomiasis and appears useful to test the consequences of permanent portal foreign body modification on fibroblastic stimulation, collagen deposition, and fibrous tissue remodeling.

5973 INCREASED BILIRUBIN EXCRETION INTO BILE AFTER CHRONICAL [sic] CLOFIBRATE (C) ADMINISTRATION IN THE RAT [Abstract]. (Eng.) Kutz, K.; Schulte, A.; Fevery, J. (Medizinische Poliklinik, Univ. Bonn, Bonn, W. Germany). *Digestion* 16(4): 331; 1977.

5974 MECHANISM FOR TRICHLOROETHYLENE HEPATOTOXICITY [Abstract]. (Eng.) Allemand,

H.; Pessayre, D.; Descatoire, V.; Degott, C.; Feldmann, G.; Benhamou, J. P. (Unite de Recherches de Physiopathologie Hepatique [INSERM], Hopital Beaujon, Clichy, France). *Digestion* 16(4):331-332; 1977.

5975 INCREASED UPTAKE OF FATTY ACID BY THE ISOLATED RAT LIVER AFTER RAISING FABP CONCENTRATION BY CLOFIBRATE [Abstract]. (Eng.) Renaud, G.; Foliot, A.; Infante, R. (INSERM U 9, Hopital Saint Antoine, Paris, France). *Digestion* 16(4):330; 1977.

5976 EFFECT OF SINUSOIDAL PERFUSION ON HEPATIC GALACTOSE ELIMINATION KINETICS IN PERFUSED RAT LIVER [Abstract]. (Eng.) Chiarantini, E.; Keiding, S. (Dept. Medical Pathology, Univ. Florence, Florence, Italy). *Digestion* 16(4):340-341; 1977.

5977 TRANSPORT OF DRUGS IN ISOLATED HEPATOCYTES. THE INFLUENCE OF BILE SALTS [Abstract]. (Eng.) Vonk, R. J.; Jekel, P. A.; Meijer, D. K. F.; Hardonk, M. J. (Dept. Pharmacology, State Univ. Groningen, Groningen, Netherlands). *Digestion* 16(4):340; 1977.

5978 EFFECT OF BACTERIAL ENDOTOXINS (LPS) ON Na^+,K^+-ATPase ACTIVITY OF CANALICULAR-ENRICHED LIVER PLASMA MEMBRANES [Abstract]. (Eng.) Utili, R.; Abernathy, C. O.; Zimmerman, H. J. (Clinica Malattie Infettive, Universita di Napoli, Napoli, Italy). *Digestion* 16(4):338; 1977.

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5989 HYPERBILIRUBINEMIA AND SLOW ACETYLATION IN THE HORSE: A PARALLEL TO GILBERT'S SYNDROME (GS) [Abstract]. (Eng.) Kupfer, A.; Gronwall, R.; Preisig, R. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Digestion* 16(4):353; 1977.

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6001 THE ULTRASONICALLY GUIDED PUNCTURE OF THE GALLBLADDER IN ANIMALS: A NEW METHODOLOGICAL PROCEDURE FOR A SIMPLE AND NON-SURGICAL COLLECTION OF GALLBLADDER BILE. (Eng.) Klapdor, R.; Scherer, K.; Sepehr, H.; Kloppel, G. (I. Medical Dept., Univ. Hamburg, Martinistrasse 52, D-2000 Hamburg 20, W. Germany). *Endoscopy* 9(3): 166-169; 1977.

6002 ENUMERATION OF ALPHAFETOPROTEIN SECRETING CELLS USING A REVERSE HEMOLYTIC PLAQUE ASSAY DURING THE GROWTH OF MORRIS HEPATOMA 7777 IN CULTURE. (Eng.) de Nechaud, B.; Fromont, S.; Berges, J. (Institut de Recherches Scientifiques sur le Cancer, B.P. 8, 94800 Villejuif, France). *Biochem. Biophys. Res. Commun.* 79(3):789-795; 1977.

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6004 HIGH AFFINITY ESTROGEN BINDING BY RABBIT LIVER. (Eng.) Danzo, B. J.; Krishnamurthy, V.; Eller, B. C. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37232). *Biochim. Biophys. Acta* 500(2):310-321; 1977.

6005 ANDROGEN INHIBITION OF BASAL AND ESTROGEN-STIMULATED PROLACTIN BINDING IN RAT LIVER. (Eng.) Kelly, P. A.; LeBlanc, G.; Ferland, L.; Labrie, F.; De Lean, A. (Le Centre Hospitalier de l'Universite Laval, Quebec G1V 4G2, Canada). *Mol. Cell. Endocrinol.* 9(2):195-204; 1977.

See also, 5847, 5851, 5852, 5853, 5854, 5884, 5947, 6015, 6046, 6068, 6069, 6352, 6368, 6398, 6404, 6411, 6424, 6469, 6475, 6476, 6526, 6541.

6006 DETERMINATION OF VIABILITY OF ISCHEMIC INTESTINE BY DOPPLER ULTRASOUND. (Eng.) Cooperman, M.; Pace, W. G.; Martin, E. W., Jr.; Pflug, B.; Keith, L. M., Jr.; Evans, W. E.; *et al.* (Dept. Surgery, Ohio State Univ., Columbus, OH 43210). *Surgery* 83(6):705-710; 1978.

Experiments were carried out to determine whether Doppler ultrasound can be used to determine the viability of ischemic small intestine and to select the optimum point for resection of nonviable bowel. Twenty ischemic segments of small intestine were produced in dogs by ligating the vascular supply. The Doppler ultrasound probe then was used to determine the last point of arterial flow within the bowel wall. The dogs were re-explored after 24 hr. Histological examination of full-thickness biopsies showed the intestine to be normal in all 20 segments at the last audible Doppler signal, and in 19 of the 20 segments at 1 cm distal to the last signal. Progressive degrees of necrosis were observed at 2 and 3 cm distal to the last signal. Twenty-five segments of ischemic intestine were resected in baboons. All resections performed at the last Doppler signal or 1 cm distal to it were normal 1 month later. Of 15 resections performed at 2, 3, and 4 cm distal to the last signal, 10 showed evidence of stricture or anastomotic disruption. Doppler ultrasound is a reliable method for determining the viability of ischemic intestine and for selecting the optimum point for resection of nonviable bowel.

6007 REGULATION OF CHOLESTEROL SYNTHESIS IN CULTURED CANINE INTESTINAL MUCOSA. (Eng.) Gebhard, R. L.; Cooper, A. D. (Minneapolis Veterans Admin. Hosp., Minneapolis, MN 55417). *J. Biol. Chem.* 253(8):2790-2796; 1978.

The validity of the intestinal organ culture technique for investigating the regulation of intestinal cholesterol synthesis was examined and the effects of free cholesterol, oxygenated cholesterol derivatives, bile salts, and lipoproteins on this process were studied in canine ileal mucosa maintained in organ culture for 6 hr. Viability was monitored by light and electron microscopy, measurement of cellular enzymes, and the ability to actively transport a glucose analogue. The activity of 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase, the rate-limiting enzyme of cholesterol synthesis, increased fourfold during the 6-hr culture. A parallel increase occurred in the rate of acetate incorporation into digitonin-precipitable sterols during this period. This increase was prevented by the addition of 0.2 mM cycloheximide to the culture. Pure colesterol, 7-ketocholesterol, and 25-hydroxycholesterol, when present at 0.2 mM during the last 4 hr of culture, also caused significant ($p<0.01$) suppression of the rise in HMG-CoA reductase activity (final HMG-CoA reductase with the three sterols was 77 ± 4%, 68 ± 5%, and 58 ± 3% of control postculture value, resp.). Bile salts at low, nontoxic concentrations also inhibited the increase of enzyme activity (2 mM taurocholate=63 ± 3% of control, 0.5 mM taurochenodeoxycholate=76 ± 6% of control). In contrast, dog lipoproteins separated by ultracentrifugation failed to significantly affect intestinal cholesterol synthesis in these short-term organ cultures. The intestinal organ culture technique is valid for measuring intestinal cholesterol synthesis. The suppression of cholesterol synthesis produced by the addition of cholesterol to the culture medium convincingly demonstrates that autoregulation can occur.

6008 CHYMOTRYPSINLIKE ACTIVITY OF SOME INTESTINAL BACTERIA. (Eng.) Gyr, K.; Felsenfeld, O.; Imondi, A. R. (Kantonsspital, CH-4004 Basel, Switzerland). *Am. J. Dig. Dis.* 23(5):413-416; 1978.

Since some tests of exocrine pancreatic function are based on the estimation of intestinal chymotryptic activity by using specific substrates such as *N*-benzoyl-L-tyrosyl-PABA (BT-P), the action of a number of bacteria isolated from human or monkey intestines on BT-P was investigated. The monkeys studied had an intestinal flora closely resembling that of man. Except for *Bacteroides*, *Proteus vulgaris* No. 73, *Proteus morgani* No. 202, and *Pseudomonas aeruginosa* No. 76, significant splitting of BT-P did not take place when 20 common enteric microorganisms were tested. It is concluded that with the possible exception of bacterial overgrowth of the small bowel, microbial chymotryptic activity is not important in influencing the outcome of the BT-P test.

6009 POSTNATAL DEVELOPMENT OF CIRCADIAN RHYTHMS IN DISACCHARIDASE ACTIVITIES IN RAT SMALL INTESTINE. (Eng.) Saito, M.; Sudo, M.; Matzuda, H. (Sch. Medicine, Ehime Univ., Shigenobu, Ehime 791-02, Japan). *Am. J. Physiol.* 234(5):E500-E503; 1978.

To examine the relationship between the disaccharidase activity rhythm and food intake during development, the circadian rhythms in the activities of maltase and lactase of the small intestine were examined at various stages of postnatal development in rats. When the rats were fed *ad libitum*, no circadian change in the enzyme activities was found during the suckling or the weanling period. However, approximately 1 week after the time of weaning, the enzymes showed the same circadian changes as in adult rats, with higher activities at night ($p<0.001$, difference between maltase activity at 0000 and 1200 hr). After weaning, when the rats were fed only during the daytime, the phase of the enzyme rhythm shifted about half a day, and the highest activity was observed around feeding time. However, during the suckling period, no circadian rhythm in the enzyme activities was found, even when the rats were allowed to feed only during a

restricted time of the day. The authors postulate that the postnatal development of the enzyme activity rhythm may depend on maturation of a mechanism that is based on the rats' anticipating daily feeding; if this is so, this anticipatory mechanism has not yet developed during the suckling period.

6010 SUBCELLULAR LOCALIZATION OF ENTEROKINASE IN HUMAN DUODENAL MUCOSA. (Eng.) Lobley, R. W.; Franks, R.; Holmes, R. (Manchester Royal Infirmary, Oxford Rd., Manchester M13 9WL, England). *Clin. Sci. Mol. Med.* 53(6):551-562; 1977.

To determine whether the brush border is the only subcellular locus of enterokinase activity, the localization of enterokinase was studied in human duodenal mucosa, using a subcellular fractionation technique whereby the principal organelles of the enterocyte could be separated with minimal damage, and the overall subcellular distribution of the enzyme determined. Specimens of mucosa were obtained at duodenotomy. Superficial mucosal scrapings were homogenized in isotonic sucrose solution and fractionated by differential centrifugation. The distribution of organelles among the subcellular fractions was monitored by assay of suitable marker enzymes. Enterokinase was recovered predominantly in the nuclear and brush border fraction, and 80% of the total activity was found to be particulate; approximately 20% of the enzyme was present in the soluble fraction, compared with 1% of the brush border markers sucrase and alkaline phosphatase. The brush border-containing fraction was subfractionated by treatment with hypertonic Tris followed by differential and density gradient centrifugation. Enterokinase was distributed among the subfractions in parallel with brush border markers and was concentrated in a subfraction that was highly enriched in microvillous membranes. It is concluded that enterokinase is localized primarily to the microvillous membrane of the epithelial cell brush border in man, but that, in addition, a proportion of the enzyme may be present in a soluble or easily released form in the duodenal mucosa.

6011 GLYCOPROTEIN CONTAINING VESICLES IN THE SURFACE EPITHELIAL CELLS OF THE ASCENDING COLON OF THE RAT. (Eng.) Michaels, J. E. (Univ. Cincinnati, Coll. Medicine, Cincinnati, OH 45267). *Anat. Rec.* 188(4):525-533; 1978.

The hypothesis that the glycoproteins of the cell coat are completed in the Golgi apparatus and migrate to the cell surface in vesicles has been supported by the results of radioautographic studies in the ameba and in the mouse ascending colon, and this theory was further investigated in a morphological and cytochemical study of the surface epithelial cells of the rat ascending colon. Filamentous material, resembling the cell coat, was seen to be contained in saccules toward the mature face of the Golgi apparatus and in vesicles close to the apparatus and near the terminal web. The vesicles were limited by a unit membrane composed of asymmetric osmiophilic leaflets and similar to the plasma membrane. When stained by the periodic acid-chromic acid-silver methenamine technique, silver was precipitated on the cell components containing the filamentous material, indicating the presence of glycoproteins. Narrow invaginations from the cell surface that may correspond to vesicles undergoing exocytosis were also positive for glycoproteins. The distribution of the filamentous material that was glycoprotein-positive parallels the pathway followed by material that had been found to be labeled with a tritiated glycoprotein precursor (^{3}H-fucose) in the epithelial cells of the ascending colon of the mouse. It is suggested that the system of vesicles in the rat colon cells is acting in a manner similar to the vesicles in the mouse cells to transport cell coat glycoproteins from the Golgi apparatus to the cell surface.

6012 STUDIES ON THE BRUSH BORDER MEMBRANE OF MOUSE DUODENUM: LIPIDS. (Eng.) Billington, T.; Nayudu, P. R. V. (Dept. Zoology, Monash Univ., Clayton, Victoria 3168, Australia). *Aust. J. Exp. Biol. Med. Sci.* 56(Part 1):25-29; 1978.

The types and quantities of lipids extracted from purified mouse duodenal brush border membranes were studied. Lipid:protein ratios in different membrane preparations varied from 0.58 to 0.68. Both the chloroform and non-chloroform phases were quantitatively analyzed for lipids. Chloroform extracts were composed of cholesterol, triglycerides, and phospholipids. The major neutral lipid was cholesterol. Rechromatography of the phospholipid spot showed sphingomyelin (7.9%), phosphatides of ethanolamine (61.7%), inositol (14.2%), and serine (16.2%). The average molar ratio of cholesterol to phospholipid was 1:39. Lipids in the non-chloroform phase were all glycosylated, being cerebrosides (69.3%), cerebroside sulfates (28.8%), and gangliosides (1.9%). Overall membrane lipid composition was neutral lipid 24%, phospholipid 33%, and glycolipid 43%. There are both quantitative and qualitative differences in the lipid composition of the brush border membranes of mouse and rat.

6013 LIPID SYNTHESIS IN ISOLATED INTESTINAL CELLS. (Eng.) Shakir, K. M. M.; Sundaram, S. G.; Margolis, S. (Johns Hopkins Sch. Medicine, Baltimore, MD 21205). *J. Lipid Res.* 19(4): 433-442; 1978.

Since the small intestine contributes significantly to serum cholesterol and very low density lipoprotein levels, acute regulation of lipid synthesis was investigated in isolated rat intestinal cells incubated in Krebs-Ringer bicarbonate buffer with 5 mM glucose and ^{14}C-acetate or ^3H_2O to test the suitability of this preparation for studying this phenomenon. Incorporation of ^{14}C-acetate into cellular lipids was six- to eightfold greater in crypt than in villus cells. In both cell types, the distribution of ^{14}C among the various lipid classes was as follows: 52.5% in triglycerides, diglycerides, and monoglycerides; 22.3% in cholesterol; 8.3% in cholesteryl esters; 1.9% in fatty

acids; and 15.0% in phospholipids. In contrast, the lipids in the medium contained significantly higher ($p<0.001$ or $p<0.005$) amounts of tri-, di-, and monoglycerides (61.1%) and lower ($p<0.05$) amounts of cholesteryl esters (2.3%) and phospholipids (11.9%). After saponification, two-thirds of the recovered ^3H_2O was in fatty acids and one-third in cholesterol. Ethanol treatment (10 mM) tripled ^3H_2O incorporation into cellular lipids but had no effect on ^{14}C-acetate incorporation. Epinephrine and norepinephrine (10 μM), glucagon (10 μM), dibutyryl cyclic AMP (1 mM), dexamethasone (1 mM and 1 μM), and cholera toxin (1 μg/ml) did not affect ^{14}C-acetate incorporation. It is concluded that ethanol stimulates intestinal lipid synthesis; however, in sharp contrast to their inhibition of lipid synthesis in hepatocytes and adipocytes, catecholamines, glucagon, and dibutyryl cyclic AMP do not inhibit lipid synthesis in intestinal cells.

6014 RAT INTESTINE SECRETES DISCOID HIGH DENSITY LIPOPROTEIN. (Eng.) Green, P. H. R.; Tall, A. R.; Glickman, R. M. (Beth Israel Hosp., Boston, MA 02215). *J. Clin. Invest.* 61(2):528-534; 1978.

To determine whether mesenteric lymph contains nascent high density lipoprotein (HDL), HDL was isolated from pooled rat serum and mesenteric lymph of lymph fistula rats. In most experiments, 5,5'-dithionitrobenzoic acid, an inhibitor of the enzyme lecithin:cholesterol acyltransferase, was added during the collection of lymph to prevent modification of the lipid composition of newly secreted lipoproteins. Negative staining electron microscopy of lymph high density lipoprotein revealed discoidal particles (190 ± 3 x 55 ± 1 A) which tended to form rouleaux; smaller spherical particles were also present. Serum high density lipoprotein contained only spherical particles (diameter 93 ± 4 A). Lipid analysis showed that lymph HDL was enriched in phospholipid and deficient in cholesterol esters when compared with serum HDL. The phospholipid to cholesterol esters ratio was greatest in basal lymph HDL when compared with fatty lymph and serum HDL. From analysis of the lipid compositional data and direct particle measurement by electron microscopy, it was calculated that approximately 50% of basal lymph HDL and 30% of fatty lymph HDL was discoid. Basal lymph HDL was enriched in apoprotein A-I and deficient in the arginine-rich peptide, and the apoprotein composition of fatty lymph HDL more closely resembled that of serum. These observations demonstrate that intestinal lymph contains two types of HDL particles, a discoid nascent particle deficient in cholesterol ester and rich in apoprotein AI, and spherical HDL derived from plasma. A significant amount of lymph HDL appears to be secreted by the intestine.

6015 CONTRIBUTIONS OF BILE AND PANCREATIC JUICE TO CELL PROLIFERATION IN ILEAL MUCOSA. (Eng.) Williamson, R. C. N.; Bauer, F. L. R.; Ross, J. S.; Malt, R. A. (Shriners Burns Inst., Boston, MA). *Surgery* 83(5):570-576; 1978.

To determine the relative contributions of bile and pancreatic juice to adaptive intestinal hyperplasia, cell proliferation in rat ileal mucosa was studied after supplying bile alone or the combined pancreaticobiliary effluent directly to the mid-small bowel. Bile was routed through the choledochus cannulated above the pancreas. Pancreaticobiliary secretions were diverted through a transposed duodenal segment containing the papilla. Transection of the jejunum with reanastomosis was performed as a control operation. Diversion of bile into the mid-bowel with and without pancreatic juice caused similar increases in ileal RNA (16-50%) and DNA (22-41%) contents at both 48 hr and 1 week after operation. Specific activity of DNA after injection of tritiated thymidine was greatest after diversion of the combined effluent. After 1 month, nucleic acid contents in the upper ileum after pancreaticobiliary diversion were 37% to 59% higher than after transection or biliary diversion ($p<0.005$). Likewise, after biliary diversion villous height and crypt depth were increased only at 1 week, but after diversion of both secretions increases were found at 1 week and 1 month. High luminal concentrations of bile cause transient cell proliferation in ileal mucosa, but the additional presence of pancreatic juice prolongs this adaptive response.

6016 LACK OF EFFECT OF BILE IN PATHOGENESIS OF SECRETION IN MECHANICAL SMALL BOWEL OBSTRUCTION. (Eng.) Mirkovitch, V.; Blanc, D.; Macarone-Palmieri, R.; Mosimann, F.; Robinson, J. W. L.; Menge, H. (Departement de Chirurgie Experimentale, CHUV, CH-1011 Lausanne, Switzerland). *Digestion* 17(3):204-210; 1978.

The role of stagnated bile as a possible agent provoking the intestinal secretion observed above a mechanical obstruction in dogs was explored by ligating the common bile duct and diverting the bile by means of an anastomosis between the gallbladder and the ileum distal to the obstruction. Seven days after the creation of an obstruction with bile diversion, the functional and morphological changes in the obstructed loop were almost identical to those occurring in animals with obstructions without bile diversion. The secretory response above the obstruction continued unabated, with levels of cyclic AMP in the secreting mucosae lower than in control tissues. These results suggest that the secretion in the obstructed intestine is not influenced by the presence of bile, and that this secretion may not be secondary to an increase in mucosal cyclic AMP levels.

6017 PREVENTION AND REVERSAL OF CHOLERA ENTEROTOXIN EFFECTS IN RABBIT JEJUNUM BY NICOTINIC ACID. (Eng.) Turjman, N.; Gotterer, G. S.; Hendrix, T. R. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 21205). *J. Clin. Invest.* 61(5):1155-1160; 1978.

Studies were carried out to determine whether intestinal secretion and cyclic AMP (cAMP) elevation induced by cholera toxin could be prevented, or once initiated, reversed by nicotinic acid, an

agent known to lower tissue levels of cAMP. In rabbits, four jejunal loops were constructed as alternating control (3-ml isotonic electrolyte solution) and cholera toxin (same solution containing 50 µg purified cholera toxin) loops. Net intestinal secretion was determined by measuring fluid accumulation, after which intestinal biopsies were taken for cAMP assay. The animals were pretreated either with 50 mg/kg nicotinic acid in saline 3 hr and 1 hr before the introduction of cholera toxin, or intraluminally with 200 mg/kg nicotinic acid in Ringer's lactate solution 15 min before the instillation of cholera toxin. Under these conditions, nicotinic acid blocked the cholera toxin-induced secretion and the rise in cAMP measured 3 hr after the loops were exposed to cholera toxin. The effect of the nicotinic acid administered within the lumen on net intestinal secretion was studied. Maximal inhibition of net intestinal secretion was achieved with an intraluminally administered dose of nicotinic acid of 100 mg/kg. This dose was chosen for testing the ability of nicotinic acid to reverse the effects of cholera toxin. When nicotinic acid was instilled into a fifth loop constructed distally to the four experimental loops 3 hr after exposure of these loops to cholera toxin, both intestinal secretion and elevation of cAMP were reversed. These results suggest that nicotinic acid can prevent and reverse the secretory effects of cholera toxin and may have a role in the therapy of cholera and other cAMP-associated diarrheal diseases.

6018 INFLUENCE OF DIETS HIGH AND LOW IN ANIMAL FAT ON BOWEL HABIT, GASTROINTESTINAL TRANSIT TIME, FECAL MICROFLORA, BILE ACID, AND FAT EXCRETION. (Eng.) Cummings, J. H.; Wiggins, H. S.; Jenkins, D. J. A.; Houston, H.; Jivraj, T.; Drasar, B. S.; *et al.* (Medical Res. Council Dunn Nutrition Unit, Cambridge, England). *J. Clin. Invest.* 61(4): 953-963; 1978.

Under metabolic conditions, the effect of diets containing 62 or 152 g/day of fat mainly of animal origin on bowel habit, gastrointestinal transit time, fecal microflora, bile acids, and fat excretion were investigated in six healthy young men over 4-week periods, in an effort to determine whether dietary fat could be responsible for slow transit and reduced fecal bulk, which has been associated with large bowel cancer. No change attributable to the diet was observed in the subjects' bowel habit, fecal weight, mean transit time through the gut, or in the excretion of dry matter. Total fecal bile acid excretion was significantly higher on the high fat diet (320 ± 120 mg/day) than on the low fat diet (139.7 ± 63 mg/day, t test=7.78, $p<0.001$), as was the total fecal fatty acid excretion (3.1 ± 0.71 and 1.14 ± 0.35 g/day, resp., t test=11.4, $p<0.001$). The fecal microflora, including the nuclear dehydrogenating clostridia, were unaltered by the dietary changes as was fecal β-glucuronidase activity. Dietary changes that increase animal fat intake clearly influence fecal bile acid excretion in a way that would favor the development of large bowel cancer if current theories prove to be true. Dietary fat, however, has no effect on overall colonic function so other components of the diet must be responsible for the observed associations of bowel cancer with slow transit and reduced fecal bulk.

6019 THE EFFECT OF FAT ON SECRETIN RELEASE. (Eng.) Miller, T. A.; Konturek, S. J.; Llanos, O. L.; Rayford, P. L.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX 77550). *Ann. Surg.* 187(3):303-308; 1978.

To investigate the effect of fat on secretin release, the effect of graded doses of i.v. infused secretin and intestinally perfused sodium oleate and HCl on pancreatic exocrine secretion and plasma secretin was determined in cats and dogs prepared with pancreatic fistulas. The pancreatic dose-response curves for bicarbonate following duodenal perfusion of oleate and HCl in cats were almost identical and paralleled the response to exogenous secretin. Significant elevation of plasma secretin from a basal of 189 ± 41 to 377 ± 80 pg/ml was measured with the administration of 0.5 U/kg/hr of exogenous secretin. The intraduodenal infusion of 0.5 mEq/hr of HCl resulted in a significant elevation of plasma secretin levels from a basal of 257 ± 26 to 400 ± 70 pg/ml. Although the bicarbonate response to oleate in dogs was less pronounced than the response to HCl or secretin (about 50% of that in response to HCl), the bicarbonate output was observed to increase relative to protein output with increasing doses of the intestinally perfused fat. These observations suggest that secretin or a substance with secretin-like activity may be released from the intestine on contact with fat. The inability to detect changes in secretin immunoreactivity in both cats and dogs with increasing doses of oleate suggests that if secretin is released, it is in amounts undetectable by the radioimmunoassay or that some other unknown substance with secretin-like activity may be released.

6020 EFFECT OF LACTULOSE ON AMMONIA PRODUCTION IN A FECAL INCUBATION SYSTEM. (Eng.) Vince, A.; Killingley, M.; Wrong, O. M. (Univ. Coll. Hosp. Medical Sch., London WC1E 6JJ, England). *Gastroenterology* 74(3):544-549; 1978.

The influence of lactulose on colonic ammonia metabolism was investigated using an *in vitro* fecal incubation system. Lactulose and other fermentable substrates (glucose, mannitol, and sorbitol), pH, and organic acid were varied independently so that their different effects could be determined. Fermentable substrate caused a decrease in ammonia concentration during the period of fermentation ($p<0.01$ with 0.03 M lactulose). Acidification to pH 5.0 or less, with hydrochloric acid or a lactic-acetic acid mixture, significantly reduced ammonia generation ($p<0.001$), but unlike fermentable substrates, did not lower the existing ammonia concentration. The lactic-acetic acid mixture did not reduce ammonia generation significantly below that found with acidification by hydrochloric acid. The effect of lactulose in reducing ammonia concentration is attributed to its role as a bacterial

substrate in either increasing bacterial assimilation of ammonia or reducing deamination of nitrogenous compounds. The effect of low pH in reducing generation of ammonia appears to be part of a general reduction in bacterial metabolism.

6021 MECHANISM OF CECAL SECRETION IN THE GERM FREE RAT [Abstract]. (Eng.) Donowitz, M.; Binder, H. J. (Yale Univ. Sch. Medicine, New Haven, CT). *Gastroenterology* 72(5, Part 2):1050; 1977.

6022 THE INTESTINAL PHASE OF POSTPRANDIAL GASTRIC FUNCTION IN MAN: OPPOSITE ROLES OF JEJUNUM AND ILEUM [Abstract]. (Eng.) Clain, J. E.; Go, V. L. W.; Malagelada, J. R. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 72(5, Part 2):1039; 1977.

6023 JEJUNAL FLOW, TRANSIT TIME AND MIXING FOLLOWING A SOLID-LIQUID MEAL [Abstract]. (Eng.) Matseshe, J. W.; Malagelada, J. R.; Phillips, S. F. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 72(5, Part 2):1099; 1977.

6024 INFLUENCE OF DIET COMPONENTS ON SMALL BOWEL ADAPTATION AFTER RESECTION [Abstract]. (Eng.) Buts, J. P.; Morin, C. L.; Bourassa, D.; Ling, V. (Hopital Ste-Justine, Montreal, Canada). *Gastroenterology* 72(5, Part 2):1035; 1977.

6025 RELEASE OF ACETYLCHOLINE FROM THE MYENTERIC PLEXUS OF SMALL INTESTINE [Abstract]. (Eng.) Nemeth, P. R.; Yau, W. M. (Dept. Physiology, Southern Illinois Univ., Carbondale, IL). *Gastroenterology* 72(5, Part 2):1107; 1977.

6026 DEMONSTRATION OF FATIGUE OF SECRETIN RESPONSE TO ACID PERFUSION OF THE SMALL INTESTINE [Abstract]. (Eng.) Chung, R. S. K.; Johnson, G. M. (Veterans Admin. Hosp., Iowa City, IA). *Gastroenterology* 72(5, Part 2):1038; 1977.

6027 THE MECHANISM BY WHICH ACID STIMULATES SECRETIN RELEASE: A UNIFYING MODEL [Abstract]. (Eng.) Moore, E. W. (Medical Coll. Virginia, Richmond, VA). *Gastroenterology* 72(5, Part 2):1104; 1977.

6028 CANINE DUODENAL MUCOSA HAS AN INDEPENDENT MECHANISM FOR BICARBONATE NEUTRALIZATION OF ACID. (Eng.) Harmon, J. W.; Woods, M. (Walter Reed Army Inst. Res., Washington, DC). *Surg. Forum* 28:421-423; 1977.

6029 THE ENZYMIC ACTIVITY OF TRANSIENT SODIUM DODECYL SULPHATE-PROTEIN COMPLEXES OF RAT INTESTINAL MALTASE-GLUCOAMYLASE FORMED DURING DISSOCIATION. (Eng.) Flanagan, P. R.; Forstner, G. G. (Hosp. Sick Children, Toronto, Ontario M5G 1X8, Canada). *Biochem. Soc. Trans.* 5(5):1542-1543; 1977.

6030 THE ROLE OF PHOSPHATE IN THE ACTION OF VITAMIN D ON THE INTESTINE. (Eng.) Birge, S. J.; Miller, R. (Washington Univ. Sch. Medicine, St. Louis, MO). *J. Clin. Invest.* 60 (5):980-988; 1977.

6031 ANESTHETIC PROPERTIES OF DUODENAL HORMONES. (Rus.) Rafes, Iu. E.; Sheleketina, I. I.; Averyanova, L. P. (Dnepropetrovsk Scientific Res. Inst. Gastroenterology, Dnepropetrovsk, USSR). *Anesteziol. Reanimatol.* (2):69-70; 1977.

6032 IMMUNOMORPHOLOGICAL DETECTION OF MELATONIN SYNTHESIS IN ENTEROCHROMAFFIN CELLS. (Rus.) Raikhlin, N. T.; Kvetnoy, I. M.; Kadagidze, Z. G.; Sokolov, A. V. (Oncological Center, USSR Acad. Medical Sciences, Moscow, USSR). *Arkh. Patol.* 39(7):55-58; 1977.

6033 RADIOIMMUNOASSAY FOR HUMAN SECRETIN DETERMINATION. (Ger.) Girard, J.; Baumann, J. B.; van Hees, G.; Kayasseh, L.; Gyr, N.; Stalder, G. A. (Kinderspital, Romergasse 8, CH-4005 Basel, Switzerland). *Schweiz. Med. Wochenschr.* 107(15): 542-544; 1977.

6034 EFFECTS OF LESIONS OF CERTAIN ZONES OF THE BRAIN ON CELL MITOSIS IN THE SMALL INTESTINAL EPITHELIUM OF THE RAT. (Fre.) Bindoni, M.; Bava, A.; Stanzani, S.; Campione, C.; Nicotra, I. (Istituto di Fisiologia umana dell'Universita di Catania, Viale Andrea-Doria, 6, 95125 Catania, Italy). *C. R. Acad. Sci. [D] (Paris)* 284(16):1565-1568; 1977.

6035 EFFECTIVENESS OF ENTEROSTOMY IN MECHANICAL INTESTINAL OBSTRUCTION. (Rus.) Makhachev, M. O.; Arbuliev, M. G. (Dept. Clinical Surgery and Topographical Anatomy, Dagestan Medical Inst., Makhachkala, USSR). *Khirurgiia (Mosk.)* (11):61-64; 1977.

6036 ENZYMOMORPHOLOGY IN SUCKLING RABBITS WITH CHOLERAGEN TOXICITY. (Rus.) Isupov, I. V.; Sageeva, O. F. ("Mikrob" All-Union Scientific Res. Inst. Plague Control, Saratov, USSR). *Arkh. Patol.* 39(5):59-63; 1977.

6037 NEURAL AND ENDOCRINE CONTROL SYSTEMS ACTING ON THE POPULATION KINETICS OF THE INTESTINAL EPITHELIUM. (Eng.) Tutton, P. J. M. (Dept. Anatomy, Monash Univ., Clayton 3168, Australia). *Med. Biol.* 55(4):201-208; 1977.

6038 MALFUNCTION OF INTESTINAL MUCUS AND MUCUS PRODUCTION. (Eng.) Forstner, G.; Sturgess, J.; Forstner, J. (Hosp. Sick Children, 555 University Ave., Toronto, Ontario M5G 1X8, Canada). *Adv. Exp. Med. Biol.* 89:349-369; 1977.

6039 NUCLEAR UPTAKE OF CHOLECALCIFEROL METABOLITES IN RAT DUODENAL MUCOSA. (Eng.) Bachelet, M.; Ulmann, A.; Cloix, J. F.; Funck-Brentano, J. L. (INSERM U-90, Hopital Necker, 161, rue de Sevres, 75730, Paris Cedex 15, France). *J. Steroid Biochem.* 8(10):1047-1049; 1977.

See also, 5857, 5864, 5867, 5889, 5904, 5910, 5922, 6041, 6044, 6054, 6200, 6219, 6338, 6410.

GENERAL

6040 PRIMATE MESENTERIC BLOOD FLOW: EFFECTS OF VASOPRESSIN AND ITS ROUTE OF DELIVERY. (Eng.) Freedman, A. R.; Kerr, J. C.; Swan, K. G.; Hobson, R. W., II. (Coll. Medicine and Dentistry, of New Jersey--New Jersey Medical Sch., 100 Bergen St., Newark, NJ 07103). *Gastroenterology* 74(5, Part 1):875-878; 1978.

To investigate whether vasopressin is largely inactivated by a single passage through the liver (in which case its effects on the mesenteric circulation should be far greater after intra-arterial than after i.v. administration) or whether it is eliminated primarily via renal glomerular filtration (in which case the route of administration should not influence the drug's effect on regional circulations), the effects of vasopressin on blood flow in the superior mesenteric artery and on mean arterial pressure and portal venous pressure were measured in seven rhesus monkeys. Vasopressin (5×10^{-5} to 5×10^{-2} U/kg) was injected, as either a bolus, or infused both i.v. and intra-arterially to assess the influence of the route of administration upon hemodynamic responses. Dose-dependent decreases in superior mesenteric arterial flow were observed during both intra-arterial and i.v. injections of vasopressin. No statistically significant differences between the two routes of administration, the decreases in flow, and changes in pressure were observed. These observations suggest that i.v. administered vasopressin will be as effective as intra-arterially administered vasopressin in reducing mesenteric blood flow, and thus portal venous pressure, in man. Hence, there is little evidence to favor the intra-arterial use of vasopressin clinically.

6041 THE EFFECTS OF CHOLERA TOXIN ON INTRAMURAL BLOOD FLOW DISTRIBUTION AND CAPILLARY HYDRAULIC CONDUCTIVITY IN THE CAT SMALL INTESTINE. (Eng.) Cedgard, S.; Hallback, D. A.; Jodal, M.; Lundgren, O.; Redfors, S. (Dept. Physiology, Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 102(2):148-158; 1978.

To investigate the possible involvement of circulatory parameters in the pathogenesis of the fluid losses in cholera, blood flow distribution to the mucosa-submucosa and to the muscularis in the cat small intestine was investigated with a ^{85}Kr-elimination technique before and after exposing the intestinal mucosa for 30 min to cholera enterotoxin (50-200 mg/10 cm of intestine). In all experiments, the toxin induced an intestinal secretion. Concomitantly, total intestinal blood flow was increased to a level 50% above control 3 hr after exposure. This vasodilatation reflected a doubling of mean blood flow in the mucosa-submucosa, while muscularis blood flow remained unchanged. In another series of experiments, the effect of cholera toxin on intestinal capillary hydraulic conductivity was investigated by determining the capillary filtration coefficient (CFC). A slight increase in CFC was noted during the 3-hr observation period, but this was not more pronounced than would have been expected from the concomitant vasodilatation. It is concluded that hemodynamic changes in the intestinal mucosa may be one of the several factors that probably are involved in the pathogenesis of cholera.

6042 ELECTROSURGICAL TREATMENT OF EXPERIMENTAL BLEEDING CANINE GASTRIC ULCERS: DEVELOPMENT OF A COMPUTER CONTROL AND A BETTER ELECTRODE. (Eng.) Piercey, J. R. A.; Auth, D. C.; Silverstein, F. E.; Willard, H. R.; Dennis, M. B.; Ellefson, D. M.; *et al.* (Dept. Medicine, Univ. Washington, Seattle, WA 98195). *Gastroenterology* 74(3):527-534; 1978.

An analogue computer that can be inserted in the circuit between a commercial electrosurgical generator and the active electrode is described for the electrosurgical treatment of gastrointestinal bleeding. The efficacy and safety of this technique was tested in experimental bleeding gastric ulcers in dogs. The computer can record the actual energy delivered to the tissue at any arbitrary generator setting. Additionally, it can deliver a predetermined amount of energy by continuously adjusting

the voltage of the generator to compensate for changes in the tissue impedance during electrocoagulation (power leveling). A special electrode was devised to assure the reproducibility of the area of tissue contact. By using a force gauge at laparotomy with a predetermined energy of 20 joules, the effect of electrode pressure on the depth of injury was measured. Light pressure (1.3 newtons/cm^2) injured a mean of 36% and moderate pressure (6.4 newtons/cm^2) a mean of 87% of gastric wall thickness. Electrocoagulation applied in the clinical manner, or predetermined by power leveling, stopped all bleeding from experimental gastric ulcers with the same amount of energy for each method. Similarly, chronic studies of the depth of injury with each method of electrocoagulation showed no difference. Furthermore, the whole thickness of the gastric wall was injured in 4% of ulcers treated, and there was no significant difference between the two methods of applying the electrocoagulation. Thus, despite the ability to control energy delivered during monopolar electrocoagulation of experimental gastric ulcers, the depth of injury to the gastric wall is unpredictable and, at times, excessive. Further studies of other types of electrocoagulation are needed and will be facilitated by the availability of this computer-controlled electrosurgical generator.

6043 METABOLIC RESPONSES TO ENTERAL AND PARENTERAL NUTRITION. (Eng.) Lickley, H. L. A.; Track, N. S.; Vranic, M.; Bury, K. D. (Women's Coll. Hosp., 76 Grenville St., Toronto, Ontario M5S 1B2, Canada). *Am. J. Surg.* 135(2):172-176; 1978.

The metabolism of enteral and parenteral diets were compared to gain information on differences in hormone release with the two routes of administration. Seven pairs of Wistar rats were simultaneously infused with a chemically formulated nutritionally complete amino acid-glucose diet that was delivered, at the same rate, into a central vein or into a feeding gastrostomy. The intragastrically infused rats showed greater weight gain than did the i.v. infused rats ($p<0.05$). This could not be explained by fluid retention, since intake and output were similar in the two groups of animals. There was a greater increase in serum immunoreactive insulin (IRI) at day 8 in the intragastrically infused animals, but a smaller increment in serum immunoreactive pancreatic glucagon (IRG) at that point. Levels of enteroglucagon or glucagon-like immunoreactivity (GLI) were maintained in the intragastrically infused rats but declined markedly in the i.v. infused rats ($p<0.02$) in comparison with that in the intragastrically infused rats after day 8. It is possible that the greater release of IRI seen with the intragastric amino acid-glucose feeding contributes to better disposal of nutrients and greater weight gain. The presence of nutrients in the intestinal lumen may have stimulated the release of GLI, which in turn is insulinotropic.

6044 IMMUNOLOGICAL STUDIES IN ULCERATIVE COLITIS: EXTRACTION, FRACTIONATION, AND IMMUNOLOGICAL CHARACTERIZATION OF GERM-FREE RAT COLON ANTIGEN. (Eng.) Carlsson, H. E.; Sundblad, G.; Hammarstrom, S.; Perlmann, P.; Gustafsson, B. E. (Dept. Immunology, Univ. Stockholm, S-106 91 Stockholm, Sweden). *Arch. Biochem. Biophys.* 187(2): 366-375; 1978.

Studies were carried out to purify and define the antigen(s) against which patients with ulcerative colitis have antibodies. Intestinal mucins from germ-free rats contained antigens reactive with sera from patients with ulcerative colitis, in addition to human blood group A- and H-like antigens. A crude antigen extract was obtained by phenol-water extraction at 65 C. Two intestinal glycoproteins were purified from the extract by fractionated ethanol precipitation, ion-exchange chromatography, and gel filtration. The glycoproteins (2aI and 4aIIb) were homogeneous in regard to electrical charge and molecular size. Both were glycoproteins of the blood group-substance type. Component 2aI was very rich in *N*-acetylgalactosamine and threonine and low in *N*-acetylglucosamine and sialic acid(s). It had strong blood group A-like activity, weak blood group H activity, and no colon antigen activity as defined by patients' sera. Component 4aIIb was rich in sialic acid(s). About 40% of the sera from patients with ulcerative colitis reacted with this component. No blood group A- or H-like activity could be demonstrated. Colon antigen activity was sensitive to periodate oxidation (0.02 M $NaIO_4$, pH 4.0, 4 C, 18 hr) but resistant to boiling at neutral pH. It was very sensitive to acid hydrolysis (0.01 M HCl, 100 C). In fact, colon antigen activity was significantly reduced when subjected to weak acid hydrolysis under conditions that only appeared to release sialic acids. Further studies are needed to resolve the complex antibody reactivity pattern of sera from patients with ulcerative colitis to colon antigen.

6045 USE OF ARGON LASER IN THE TREATMENT OF EXPERIMENTALLY INDUCED UPPER GASTROINTESTINAL BLEEDING IN PRIMATES. (Eng.) Butler, M. L.; Morris, W. (Letterman Army Medical Center, Presidio of San Francisco, CA 94129). *Gastrointest. Endosc.* 24(3):117-118; 1978.

The feasibility of using laser photocoagulation in the treatment of upper gastrointestinal bleeding was studied in rhesus monkeys with experimental gastric and duodenal bleeding. Lesions were made using a modified biopsy forceps. Stomach lesions treated by laser irradiation stopped bleeding in an average time of 122 sec, using an average photocoagulation time of 38.8 sec. Lesions left untreated in the stomach bled for an average of 276 sec. In only one animal, bleeding continued after 15 min despite laser therapy. In the duodenum, laser photocoagulated lesions required an average of 110 sec to stop bleeding, while control lesions averaged 190 sec. The average coagulation time with the laser was 28.5 sec. While laser coagulation of mucosal hemorrhage has been found feasible in this primate model, the authors caution that further experimentation is needed before the method is clinically applied in man.

6046 INVESTIGATION OF THE RESORPTION AND RETENTION OF RADIOACTIVE SULFUR IN ALBINO RATS FOLLOWING THE ADMINISTRATION OF ^{35}S-LABELED 3,5-DIBENZYL-2-THIONO-1,3,5-TETRAHYDROTHIADIAZINE (D 47), A SYNTHETIC MUSTARD OIL. (Ger.) Drauschke, W.; Grahl, R. (Zentrallabor der Sektion Pflanzenproduktion, Martin-Luther-Universitat Halle, Emile-Abderhalden-Str. 25b, 401 Halle, E. Germany). *Isotopenpraxis* 13(10):352-358; 1977.

6047 ENTERIC RESISTANCE AND COXSACKIEVIRUS B. (Eng.) Kibrick, S.; Loria, R. M. (Boston Univ. Sch. Medicine, 80 E. Concord St., Boston, MA 02118). *Am. J. Clin. Nutr.* 30(11):1871-1875; 1977.

6048 THE GUINEA PIG AS A MODEL FOR THE ASYMPTOMATIC HUMAN TYPHOID CARRIER. (Eng.) Lavergne, G. M.; James, H. F.; Martineau, C.; Diena, B. B.; Lior, H. (Animal Resources Div., Health and Welfare Canada, Tunney's Pasture, Ottawa K1A OL2, Canada). *Lab. Anim. Sci.* 27(5, Part 2): 806-816; 1977.

6049 INVESTIGATIONS ON TENSILE STRENGTH OF INTESTINAL ANASTOMOSIS IN PHARMACOLOGICALLY INDUCED BLOOD CLOTTING DISTURBANCES. (Eng.) Goralski, S. A.; Wichrzycka, E.; Wieczorek, K.; Szczepanik, A. B.; Rudowski, W. J.; Schier, J. F. (Inst. Hematology, ul. Chocimska 5, 00-957 Warszawa, Poland). *Z. Exp. Chir.* 10(6):357-360; 1977.

6050 SOME HUMAN PHYSIOLOGICAL RESPONSES TO THE CONSUMPTION OF GLUCOSE SYRUPS AND RELATED CARBOHYDRATES. (Eng.) Birch, G. G.; Kearsley, M. W. (Natl. Coll. Food Technology, Univ. Reading, St. Georges Ave., Weybridge, Surrey, England). *Staerke* 29(10):348-352; 1977.

6051 ATTEMPTS TO PRODUCE SALIVARY CYSTS IN THE DOG. (Eng.) DeYoung, D. W.; Kealy, J. K.; Kluge, J. P. (Dept. Veterinary Clinical Sciences, Iowa State Univ., Ames, IA 50011). *Am. J. Vet. Res.* 39(1):185-186; 1978.

6052 THE BLOOD SUPPLY OF THE ABDOMINALLY-PLACED VERTICAL SIGMOID COLON. (Eng.) Roberts, W. H.; Engen, P. (Dept. Anatomy, Loma Linda Univ., Loma Linda, CA 92354). *Anat. Anz.* 142(3):165-167; 1977.

6053 URINARY EXCRETION OF DYE IN DOGS INFUSED WITH BSP OR ITS GLUTATHIONE CONJUGATE. (Eng.) Barnhart, J. L.; Combes, B. (Southwestern Medical Sch. at Dallas, 5323 Harry Hines Blvd., Dallas, TX 75235). *Am. J. Dig. Dis.* 23(1):65-71; 1978.

6054 OSMOTIC VASODILATION IN THE SMALL INTESTINE [Abstract]. (Eng.) Granger, D. N.; Levine, S. E.; Brace, R. A.; Taylor, A. E. (Univ. Mississippi Medical Center, Jackson, MS). *Physiologist* 20(4):37; 1977.

6055 PANCREATIC VASODILATATION INDUCED BY HYPEROSMOLALITY [Abstract]. (Eng.) Jarhult, J.; Thulin, A. (Univ. Hosp., Lund, Sweden). *Ir. J. Med. Sci.* 146(Suppl. 1):46-47; 1977.

See also, 5888, 5906, 6031, 6059, 6199.

DIAGNOSTIC PROCEDURES

6056 HIGH DENSITY, LOW VISCOSITY BARIUM FOR FINE MUCOSAL DETAIL ON DOUBLE-CONTRAST UPPER GASTROINTESTINAL EXAMINATIONS. (Eng.) Gelfand, D. W. (Bowman Gray Sch. Medicine, Winston-Salem, NC 27103). *Am. J. Roentgenol.* 130(5):831-833; 1978.

A high density, low viscosity barium suspension was developed to maximize demonstration of very small mucosal details on double-contrast upper gastrointestinal examinations. The barium sulfate suspension was formulated using a considerable proportion of large particles (up to 20 μm), thus increasing the potential packing density and decreasing viscosity by decreasing the relative amount of water adsorbed onto the surface of the particles. A low molecular weight dispersant (sodium citrate) was included. Dimethylpolysiloxane was added as an antifoaming agent and sorbitol as a stabilizer. The suspension is capable of 250% weight/volume densities without mechanical mixing, while retaining a low viscosity. *In vitro* tests showed the material to be superior to suspensions of greater viscosity and/or more moderate density in demonstrating fine surface detail. Clinical experience with more than 3,000 examinations with the 250% weight/volume barium suspension has shown the material to be capable of demonstrating areae gastricae or similar fine nodular patterns in approximately 70% of studies. Although a particular preparation has been described, the underlying principles are thought to be generally applicable.

6057 STIGMATA OF RECENT HAEMORRHAGE IN DIAGNOSIS AND PROGNOSIS OF UPPER GASTROINTESTINAL BLEEDING. (Eng.) Foster, D. N.; Miloszewski, K. J. A.; Losowsky, M. S. (Birch Hill Hosp., Rochdale, Lancastershire, England). *Br. Med. J.* 1(6121):1173-1177; 1978.

To determine satisfactory criteria for identifying patients at high risk of rebleeding after an initial upper gastrointestinal hemorrhage, 245/277 consecutive episodes of suspected upper gastrointestinal bleeding were examined endoscopically. The usefulness of emergency endoscopy in these cases was also assessed. Lesions bearing stigmata of recent hemorrhage were found in 110 of 233 patients who were judged to have bled; 78 had lesions without stigmata and in 45 no lesion was seen. Results in 176 entirely unselected admissions for upper gastrointestinal bleeding were similar: of 153 who underwent endoscopy, 77 had lesions with stigmata, 46 had lesions without stigmata, and 30 had no lesion. Forty-eight chronic duodenal and 41 chronic gastric ulcers were identified by endoscopy. Stigmata were found in 27 and 33 of these cases, resp. Sixteen patients had multiple lesions, and in 12, the presence of stigmata permitted diagnosis of the source of the hemorrhage. Stigmata were more likely to be seen in cases of duodenal ulcer ($p<0.006$), Mallory-Weiss lesions ($p<0.086$), and esophageal varices ($p<0.057$) when endoscopy was performed within 12 hr of bleeding, but were equally common in cases of gastric ulcer after both short and long intervals. In the absence of stigmata, 21 patients with duodenal ulcer had further hemorrhage, and 1 other needed emergency surgery; no patient with gastric ulcer had further hemorrhage or needed emergency surgery. In contrast, when stigmata were present 15/27 patients with duodenal ulcer had further hemorrhage and 17/27 needed emergency surgery; of the 33 patients with gastric ulcer, 10 had further hemorrhage and 15 required emergency surgery. Superficial mucosal lesions may have been the source of hemorrhage when an ulcer unmarked by stigmata was seen at endoscopy. Stigmata were superior to any other single factor or combination of factors in predicting rebleeding and the need for emergency surgery.

6058 BENIGN RETROPERITONEAL EMPHYSEMA ASSOCIATED WITH UPPER GASTROINTESTINAL ENDOSCOPY. (Eng.) Martin, W. C.; Nagai, N.; Diner, W.; Texter, C., Jr. (Univ. Arkansas for Medical Sciences, 4301 W. Markham St., Little Rock, AR 72201). *Arch. Intern. Med.* 138(5):759-761; 1978.

Two cases of retroperitoneal emphysema and one case of coexistent retroperitoneal emphysema and pneumoperitoneum that developed after upper gastrointestinal (GI) endoscopy are presented. An 80-yr-old woman developed pneumoperitoneum and retroperitoneal emphysema following a GI series. Barium leakage did not occur, and she recovered uneventfully. A 75-yr-old woman underwent endoscopy for evaluation of epigastric pain; 5 days later, an i.v. pyelogram revealed a bubbly lucency around both kidneys, gas at the top of the right kidney, and psoas shadows outlined by gas. Pancreatic body cancer and widespread intra-abdominal metastasis were found at laparotomy. In the third case, a 55-yr-old man developed asymptomatic retroperitoneal emphysema one day after gastroduodenoscopy; bubbly lucencies surrounded the right kidney and psoas shadow and extended up to the right hemidiaphragm. The last two cases also resolved spontaneously. It must be expected that, because of the increased frequency of endoscopic and associated procedures, retroperitoneal emphysema may become more common.

6059 RADIONUCLIDE IMAGING OF BOWEL INFARCTION COMPLICATING SMALL BOWEL INTUSSUSCEPTION IN DOGS. (Eng.) Kressel, H. Y.; Moss, A. A.; Montgomery, C. K.; Brito, A. C.; Hoffer, P. B. (Hosp. Univ. Pennsylvania, Philadelphia, PA 19104). *Invest. Radiol.* 13(2):127-131; 1978.

Technetium-99m (^{99m}Tc)-pyrophosphate was investigated for use as an indicator of intestinal infarction in intussuscepted bowel. ^{99m}Tc-pyrophosphate was injected i.v. 24 and 48 hr following the creation of irreducible intussusceptions in eight adult dogs. In six dogs, infarction developed in the intussusception, and each demonstrated increased uptake of ^{99m}Tc-pyrophosphate on *in vivo* scintiscans. The two dogs without infarction showed no increased uptake of the radionuclide. Well-counting and specimen scanning confirmed increased radionuclide in the infarcted intussusceptions. These observations suggest that ^{99m}Tc-pyrophosphate is a reliable indicator of the vascular compromise that sometimes occurs with intestinal intussusception.

6060 THE ENZYME LINKED IMMUNOSORBENT ASSAY IN THE DIAGNOSIS OF HUMAN BILHARZIASIS [sic]. (Eng.) Farag, H. F.; Barakat, R. M. R. (Medical Res. Inst., 165 El Horreya Ave., El Hadara, Alexandria, Egypt). *Tropenmed. Parasitol.* 29(1):12-14; 1978.

The sera of 72 patients with *Schistosoma mansoni* and/or *S. hematobium* ova in their stools or urine, 16 persons without ova but from schistosomiasis-endemic areas, and 9 healthy persons from areas without schistosomiasis were examined by enzyme-lined immunosorbent assay (ELISA) to evaluate the use of ELISA in the diagnosis of human bilharziosis. Extinction was measured spectrophotometrically at 400 nm. The extinction values were 0.088 ± 0.0193, 0.266 ± 0.1177, 0.547 ± 0.2426, and 0.559 ± 0.2189 for the 9 controls, 6 patients with *S. hematobium*, 33 with *S. mansoni*, and 33 with both parasites, resp.; the values for all patients were significantly different ($p<0.0005$) from the controls. Among the 16 results. No false-negative cases were recorded. The false-positive results may have been due to cross reactions, a history of schistosomiasis, or a low worm burden that escaped clinical detection (as in an early stage of infection, as all the false-positive subjects were 10-15 yr old). ELISA is a very sensitive and accurate test for the diagnosis of human bilharziosis.

6061 DIAGNOSIS OF EXOCRINE PANCREATIC INSUFFICIENCY IN CYSTIC FIBROSIS BY THE SYNTHETIC PEPTIDE N-BENZOYL-L-TYROSYL-p-AMINOBENZOIC ACID. (Eng.) Nousia-Arvanitakis, S.; Arvanitakis, C.; Greenberger, N. J. (Kansas Univ. Medical Center, Rainbow Blvd. at 39th St., Kansas City, KS 66103). *J. Pediatr.* 92(5):734-737; 1978.

The urinary excretion of para-aminobenzoic acid (PABA) following the administration of *N*-benzoyl-L-tyrosyl-PABA was evaluated in 24 patients with cystic fibrosis (CF) and 14 controls as an index of exocrine pancreatic function to determine its role in the diagnosis of exocrine pancreatic insufficiency. Cumulative percent PABA recovery in 6 hr was significantly lower in CF patients compared with the control group (mean 37% versus 70%, $p<0.001$). No overlap was noted between the two groups. There was good correlation between PABA recovery ($p<0.001$), fecal chymotrypsin activity ($r=0.64$, $p<0.01$), and coefficient of fat absorption ($r=0.66$, $p<0.01$). These findings indicate that PABA recovery is significantly reduced in patients with CF and steatorrhea and may prove a practical and reliable test of pancreatic insufficiency.

6062 ALPHA$_1$-FETOPROTEIN IN THE DIAGNOSIS OF HEPATOMA: STATISTICAL AND COST BENEFIT ASPECTS. (Eng.) Phillips, P. J.; Rowland, R.; Reid, D. P.; Coles, M. E. (Inst. Medical and Veterinary Science, Frome Rd., Adelaide, South Australia 5000, Australia). *J. Clin. Pathol.* 30(12):1129-1133; 1977.

Studies were carried out to determine a diagnostic alpha$_1$-fetoprotein (AFP) concentration in the sera of hepatoma patients. Data on the sensitivity and specificity of different diagnostic AFP concentrations were taken from the literature and evaluated statistically and by Bayesian analysis. In 610 patients (hepatoma prevalence 0.028), it was calculated that a sensitive diagnostic concentration (30-50 ng/ml) will misdiagnose hepatoma so often that a positive test will indicate hepatoma in only 10% of cases. A positive test at a specific diagnostic concentration (500 ng/ml) indicates hepatoma in 100% of cases and is preferable in terms of cost benefit. Although the lower concentration will diagnose a larger proportion of patients with hepatoma (74% compared with 59%) the "costs" of excluding false positives are considerable (Australian $2,545 per extra case with 2.5% of patients suffering significant morbidity). In western societies, where the prevalence of hepatoma is low, a higher, less sensitive but more specific diagnostic serum AFP concentration is appropriate for use.

6063 THE DIAGNOSTIC VALUE OF LP-X DETERMINATIONS IN PATIENTS WITH LIVER DISEASE. (Eng.) Ward, A. M. (Hallamshire Hosp., Sheffield, England). *Protides Biol. Fluids Proc. Colloq.* 25: 333-336; 1977.

The value of lipoprotein X (LP-X) determinations as an additional assessment of cholestasis was examined by analyzing serum samples from a series of 456 consecutive patients with jaundice or other clinical evidence of liver disease. The patients were divided into four major groups (prehepatic disease, 105 patients; hepatocellular disease, 138; extrahepatic biliary and pancreatic disease, 60; malignant disease, 88) and the results of the LP-X assay were compared with the histological and biochemical profiles of each patient to examine the degree of correlation. In the group with prehepatic disease, the two patients with jaundice (postoperative) by histological and biochemical criteria were also LP-X positive. In the group with hepatocellular disease, histology and biochemistry detected 51 cases of essentially intrahepatic cholestasis, but only 32/51 were LP-X positive, and 1 case was LP-X-positive but negative by histology and biochemistry. There was excellent correlation between LP-X and histology/biochemistry determinations in the group with extrahepatic biliary and pancreatic disease (59/74, plus 1 LP-X-positive but histology/biochemistry-negative) with two major exceptions: (1) in cholelithiasis and biliary colic, the LP-X level returned to normal faster than did the enzyme data following passage of the stone, so that six patients with biochemical evidence of cholestasis were LP-X-negative and (2) LP-X determination was unreliable in drug-induced cholestasis (4/6 due to estrogen and 2/8 due to chlorpromazine were LP-X-negative). LP-X determination and the histology/biochemistry profile were in good agreement in cases of malignant disease (17/21, plus 1 LP-X-positive but histology/biochemistry-negative case). LP-X levels were not related to levels of cholesterol, adenosine deaminase, γ-glutamyl transpeptidase, or alanine amino transferase. There was a positive correlation between the levels of LP-X and of bilirubin, alkaline phosphatase, and 5'-nucleotidase, and there was a

negative correlation between LP-X and aspartate amino transferase levels.

6064 THE VALIDITY OF ^{99m}Tc-PYRIDOXYLIDENE-GLUTAMATE (P.G.) CHOLESCINTIGRAPHY AS A DIAGNOSTIC TEST FOR CHOLECYSTITIS. (Eng.) Stadalnik, R. C.; Kraus, J. F.; Matolo, N. M.; Krohn, K. A. (Sacramento Medical Center-UCD, 4301 X St.-Unit I, Sacramento, CA 95817). *Clin. Nucl. Med.* 3(4): 142-146; 1978.

The diagnostic value of technetium-99m-pyridoxylideneglutamate cholescintigraphy (^{99m}Tc-PGC) was studied in patients with and without cholecystitis, and its validity was compared with oral cholecystography (OC) and ultrasonography (US). ^{99m}Tc-PGC was applied to 50 patients with acute, subacute, and/or chronic cholecystitis with cystic duct obstruction proven histologically and operatively, and also to 27 healthy volunteers and 43 patients with upper right quadrant abdominal pain who subsequently were proven free of gallbladder disease. In addition, 38 patients had OC and 31 had US performed. The sensitivity and specificity of ^{99m}Tc-PGC were 100%. For OC the sensitivity was 87%, and the specificity was 100%. For US the sensitivity was 70%, and the specificity was 93%. The repeatability of ^{99m}Tc-PGC, OC, and US were 100%, 94% and 81%, resp. These data show that ^{99m}Tc-PGC, a safe and simple technique, is a valid diagnostic tool in the evaluation of patients with cholecystitis.

6065 CHOLECYSTOSONOGRAPHY FOR THE DIAGNOSIS OF CHOLECYSTOLITHIASIS. (Eng.) Dempsey, P. J.; Phillips, J. F.; Warren, D. L.; Donovan, A. J. (Univ. South Alabama Coll. Medicine, Mobile, AL). *Ann. Surg.* 187(5):465-474; 1978.

Among more than 1,000 cases in which abdominal ultrasound was used because of a suspicion of cholelithiasis with or without obstructive cholecystopathy, the presence or absence of cholelithiasis was established in 86 cases either by surgery or by cholangiographic visualization of the gallbladder. A review of these latter cases is presented. The indications for ultrasound were acute right upper quadrant syndrome (53 cases), cholestasis and hepatic dysfunction (11), confirmation of oral cholangiogram (21), and allergy to iodine-containing dye (1). The gallbladder can be visualized by ultrasound (cholecystosonography) and gallstones seen as echo-producing densities. Under cholecystosonographic observation, the gallbladder can be demonstrated to contract following stimulation by cholecystokinin. This establishes patency of the cystic duct and excludes a diagnosis of acute obstructive cholecystopathy. The gallbladder was visualized in 84/86 patients. Stones were identified sonographically in 64% of 42 patients with proven gallstones (75% of the last 20 cases). The gallbladder contracted following stimulation in 18 of 20 cases with a patent cystic duct. Cholecystosonography is simple, safe, and economical. Cholecystosonography with cholecystokinin stimulation is the first diagnostic study of choice when cholecystolithiasis is suspected and the above-named indications exist. Cholecystosonography may detect gallstones in a gallbladder visualized by oral cholangiography when stones are of the same density as the contrast media.

6066 SONOGRAPHY OF THE COMMON BILE DUCT: VALUE OF THE RIGHT ANTERIOR OBLIQUE VIEW. (Eng.) Behan, M.; Kazam, E. (Hammersmith Hosp., London W.12, England). *Am. J. Roentgenol.* 130(4): 701-709; 1978.

A method of visualizing the normal or dilated common duct by gray scale ultrasonography is described; this method overcomes problems such as difficulty in differentiating between the portal vein and the mildly dilated common hepatic and common bile ducts. The patient is scanned longitudinally from the right anterior abdominal wall with the ultrasound beam directed posteromedially until two tubular structures are demonstrated in the porta hepatis. The more anterior tubular structure in this projection is the common duct. If the common duct is less than 3 mm in diameter, it may not be clearly delineated. In these cases, the absence of common duct dilatation can be inferred. The usefulness of this view for detecting common duct dilatation was evaluated in 101 consecutive cases proven by surgery, autopsy, or cholangiography. The overall accuracy was 96% (4 false-negative studies, no false positives). It is concluded that sonography should be the imaging procedure of choice for suspected extrahepatic biliary obstruction if the serum bilirubin level precludes i.v. cholangiography.

6067 SERUM ISOAMYLASE CHANGES FOLLOWING ENDOSCOPY. (Eng.) Pelot, D.; Berk, J. E.; Fridhandler, L. (Univ. California Irvine Medical Center, 101 City Drive South, Orange, CA 92668). *Gastrointest. Endosc.* 24(4):166-168; 1978.

Serum amylase changes are reviewed in patients who underwent endoscopic retrograde cholangiopancreatography (ERCP) and upper gastrointestinal endoscopy. Hyperamylasemia occurred in 24 of 36 patients in whom ERCP was performed. The rise was predominantly of pancreatic (P-type) isoamylase in 20 of the 24 with hyperamylasemia and of salivary (S-type) in the remaining 4. In patients in whom the pancreatic duct was visualized, alone or together with the common bile duct, 81.8% displayed hyperamylasemia. Isoamylase analysis revealed that the rise in amylase activity in this particular group was predominantly in P-type isoamylase. By contrast, only 1 of 23 patients with normal pre-examination amylase values who underwent esophagogastroduodenoscopy without attempted cannulation of either the bile or pancreatic duct displayed hyperamylasemia. It is concluded that hyperamylasemia developing after ERCP in which the pancreatic duct had been opacified probably reflects an induced pancreatic alteration.

6068 RADIOANATOMY OF THE SPHINCTER OF ODDI IN MEDICAL CHOLANGIOGRAPHY. (Eng.) Lamarque, J. L.; Bruel, J. M.; Dondelinger, R.; Senac, J. P.; Polge, D.; Rabischong, P.; Bonnel, F. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, June 8-9, 1976.* (Basel: S. Karger): 30-35; 1977.

6069 CHOLEDOCHOSCOPY AND THE NORMAL ODDI'S SPHINCTER. (Eng.) Vosse, A. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, June 8-9, 1976.* (Basel: S. Karger): 45-47; 1977.

6070 AN EVALUATION OF MARKERS IN THE EARLY DETECTION OF LARGE BOWEL CANCER. (Eng.) Schwartz, M. K. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021). *Cancer* 40(5, Suppl.):2620-2624; 1977.

6071 TECHNETIUM-99m-LABELLED DIETHYL-ACETANILIDO-IMINODIACETATE. A NEW HEPATOBILIARY AGENT: A PRELIMINARY REPORT. (Eng.) Tjen, H. S. L. M.; van der Pompe, W. B.; Cox, P. H. (Rotterdamsch Radio-Therapeutisch Instituut, Groene Hilledijk 301, Rotterdam, Netherlands). *Br. J. Radiol.* 50(598):735-739; 1977.

6072 IDENTIFICATION OF INTESTINAL GALLIUM COLLECTION BY IMAGING THE UPPER GASTROINTESTINAL TRACT USING ^{99m}Tc GIVEN ORALLY. (Eng.) Ladwig, S. H.; Wahner, H. W. (Mayo Clinic, 200 First St. S.W., Rochester, MN 55901). *Clin. Nucl. Med.* 2(10):344-347; 1977.

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6074 THE VALUE OF ROUTINE SIGMOIDOSCOPY. (Eng.) Derojas, J. F.; Irons, H. S., Jr. (Veterans Admin. Hosp., Wilkes-Barre, PA 18711). *Abdom. Surg.* 19(6):151-153; 1977.

6075 EVALUATION OF Tc-99m PYRIDOXAL-PHENYLALANINE AS A HEPATOBILIARY IMAGING AGENT. PART 1. EXPERIMENTAL STUDIES. (Eng.) Fotopoulos, A.; Chiotelis, E.; Koutoulidis, C.; Dassiou, A.; Papadimitriou, J. (Aretaiion Hosp., 76, Vassilissis Sophias St., Athens, T610, Greece). *J. Nucl. Med.* 18(12):1189-1193; 1977.

6076 EVALUATION OF Tc-99m PYRIDOXAL-PHENYLALANINE AS A HEPATOBILIARY AGENT. PART 2. CLINICAL TESTS. (Eng.) Papadimitriou, J.; Fotopoulos, A.; Koutoulidis, C.; Chiotelis, E.; Tountas, C. (Aretaiion Hosp., 76, Vassilissis Sophias St., Athens, T610, Greece). *J. Nucl. Med.* 18(12):1194-1198; 1977.

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6078 A STUDY OF ANTIBODY PRODUCTION FOR THE RADIOIMMUNOASSAY OF GASTRIN. (Eng.) Fabri, P. J.; McGuigan, J. E. (Univ. Florida Coll. Medicine, Gainesville, FL 32610). *Am. J. Dig. Dis.* 22(10):902-908; 1977.

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TRACT. (Rus.) Popova, Z. P.; Kameneva, S. I.; Sviridov, N. K. (Moscow Scientific Res. Inst. Roentgenology, RSFSR Ministry Public Health, Moscow, USSR). *Sov. Med.* (8):141-144; 1977

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See also, 5948, 6006, 6122, 6129, 6134, 6135, 6148, 6156, 6158, 6166, 6170, 6174, 6182, 6202, 6205, 6237, 6247, 6261, 6264, 6265, 6266, 6277, 6286, 6308, 6312, 6313, 6318, 6320, 6324, 6327, 6328, 6330, 6340, 6352, 6355, 6391, 6392, 6401, 6408, 6409, 6437, 6438, 6470, 6471, 6472, 6474, 6488, 6489, 6495, 6499, 6500, 6508, 6526, 6533, 6543, 6549, 6558.

GASTROINTESTINAL DISEASES

ESOPHAGUS

6096 ORAL CIMETIDINE IN REFLUX ESOPHAGITIS: A DOUBLE BLIND CONTROLLED TRIAL. (Eng.) Wesdorp, E.; Bartelsman, J.; Pape, K.; Dekker, W.; Tytgat, G. N. (Wilhelmina Gasthuis, Amsterdam, Netherlands). *Gastroenterology* 74(5, Part 1):821-824; 1978.

The efficacy of cimetidine therapy (1.6 g/day) was evaluated in a double-blind placebo-controlled trial in 24 patients with moderate or severe peptic reflux esophagitis. Cimetidine was superior to placebo when using endoscopic and histological criteria ($p<0.01$ and $p<0.001$, resp.). Improved patient symptomatology and lower antacid consumption failed to reach statistical significance. No change in the abnormally low lower esophageal sphincter pressure was observed at the end of the trial. No clinical side-effects or significant biochemical changes were noted. Because of its efficacy, low toxicity, and low incidence of side-effects, cimetidine appears to be a useful drug in the medical therapy of reflux esophagitis and could be a valuable alternative to surgery in some cases.

6097 ESOPHAGEAL SIGNS AFTER RESECTION OF THE GASTROESOPHAGEAL JUNCTION: ENDOSCOPIC FOLLOW-UP STUDY. (Eng.) Appelqvist, P.; Virkkula, L.; Kalima, T. V. (Univ. Central Hosp., Haartmaninkatu 4, SF-00290 Helsinki 29, Finland). *Int. Surg.* 62(6/7):341-343; 1977.

6098 THE COLUMNAR-CELL-LINED (BARRETT'S) ESOPHAGUS: A PREMALIGNANT CONDITION? (Eng.) Dorsch, E. R.; Graham, D. Y.; Lie, J. T.; Estrada, R. G. (Ben Taub General Hosp., Houston, TX). *South. Med. J.* 70(4):505-507; 1977.

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6101 MANAGEMENT OF OESOPHAGEAL PERFORATION. (Eng.) Anonymous. (No affiliation given). *Br. Med. J.* 2(6086):540; 1977.

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6103 THE INCIDENCE OF GAS BLOAT SYNDROME AND DYSPHAGIA FOLLOWING FUNDOPLICATION FOR HIATUS HERNIA. (Eng.) Walls, A. D. F.; Gonzales, J. G. (Western General Hosp., Edinburgh, Scotland). *J. R. Coll. Surg. Edinb.* 22(6):391-394; 1977.

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6113 MEDICAL MANAGEMENT OF PATIENTS WITH REFLUX ESOPHAGITIS. (Eng.) Roufail, W. M. (Forsyth Medical Specialists, P.A., Suite 88, Professional Bldg., 2240 Cloverdale Ave., Winston-Salem, NC 27103). *South. Med. J.* 71(Suppl. 1):43-44; 1978.

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6116 FREQUENCY AND DURATION OF POSTPRANDIAL GASTROESOPHAGEAL REFLUX IN NORMAL CHILDREN [Abstract]. (Eng.) Jolley, S. G.; Herbst, J. J.; Johnson, D. G.; Pena R., A.; Garnier C., R. (Univ. Utah, Coll. Medicine, Salt Lake City, UT). *Clin. Res.* 26(2):174A; 1978.

6117 EVALUATION OF LOWER ESOPHAGEAL SPHINCTER FUNCTION IN RECURRENT ACUTE RESPIRATORY DISEASE IN PEDIATRIC PATIENTS [Abstract]. (Eng.) Christie, D. L.; O'Grady, L. R.; Mack, D. V. (Mason Clinic, Seattle, WA). *Clin. Res.* 26(2): 173A; 1978.

6118 EFFECTS OF THYROCALCITONIN ON PENTAGASTRIN-INDUCED CONTRACTION OF THE LOWER ESOPHAGEAL SPHINCTER IN NORMALS AND IN PATIENTS WITH ACHALASIA [Abstract]. (Eng.) Debat, J.; Couturier, D.; Roze, C.; Debray, C. (Hopital Bichat, 170 Bd Ney, 75877 Paris, France). *Digestion* 16(1/2):208-209; 1977.

6119 MALLORY-WEISS SYNDROME [Abstract]. (Eng.) Takemoto, T. (Yamaguchi Univ. Sch. Medicine, Ube, Japan). *Gastroenterol. Jpn.* 12(4):339; 1977.

6120 GASTROESOPHAGEAL REFLUX CHARACTERISTICS AND ESOPHAGEAL ALTERATIONS IN HIATUS HERNIA. THERAPEUTIC APPLICATIONS [Abstract]. (Eng.) Ortiz, J.; Licastro, R.; Guastavino, E.; Pangaro, J. A. (No affiliation given). *Arq. Gastroenterol.* 14(3):158; 1977.

6121 ENDOSCOPIC ELECTROSURGICAL POLYPECTOMIES OF THE UPPER GASTROINTESTINAL TRACT. (Eng.) Jacobs, W. H.; Bruns, D. (Menorah Medical Center, 4949 Rockhill Rd., Kansas City, MO 64110). *Am. J. Gastroenterol.* 68(3):241-248; 1977.

6122 ENDOSCOPIC EVALUATION OF GASTROESOPHAGEAL SPHINCTER DYSFUNCTION. (Eng.) Morrissey, J. F. (Univ. Wisconsin Sch. Medicine, Madison, WI 53706). *South. Med. J.* 71(Suppl. 1):56-61; 1978.

6123 HISTOPATHOLOGIC ALTERATIONS IN ESOPHAGEAL MUCOSA SECONDARY TO GASTROESOPHAGEAL REFLUX. (Eng.) Bynum, T. E. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 21205). *South. Med. J.* 71(Suppl. 1):53-55; 1978.

6124 CONSERVATIVE MANAGEMENT OF ESOPHAGEAL STRICTURE USING DILATATION AND ANTIREFLUX THERAPY. (Eng.) Lanza, F. L. (Hillcroft Medical Clinic Assoc., 6630 DeMoss, Houston, TX 77074). *South. Med. J.* 71(Suppl. 1):8-9; 1978.

6125 MEDICAL MEASURES THAT INFLUENCE THE GASTROESOPHAGEAL JUNCTION. (Eng.) Castell, D. O. (Natl. Naval Medical Center, Bethesda, MD 20014). *South. Med. J.* 71(Suppl. 1): 26-28; 1978.

6126 HYPERTENSIVE LOWER ESOPHAGEAL SPHINCTER: A REAPPRAISAL. (Eng.) Graham, D. Y. (Baylor Coll. Medicine, 1200 Moursund Ave., Houston, TX 77030). *South. Med. J.* 71(Suppl. 1): 31-37; 1978.

6127 BLEEDING AT THE GASTROESOPHAGEAL JUNCTION. (Eng.) Katz, D.; Pitchumoni, C. S.; Thomas, E.; Antonelle, M. (New York Medical Coll., New York, NY 10029). *South. Med. J.* 71(Suppl. 1): 29-30; 1978.

6128 CURRENT TRENDS IN THE MANAGEMENT OF ESOPHAGEAL ATRESIA AND TRACHEOESOPHAGEAL FISTULA. (Eng.) Holder, T. M. (Children's Mercy Hosp., Kansas City, MO 64100). *Am. Surg.* 44(1):31-36; 1978.

6129 THE DIAGNOSIS OF MICROSCOPIC CARCINOMA OF THE ESOPHAGUS. (Eng.) Burke, E. L.; Sturm, J.; Williamson, D. (Wayne State Univ. Sch. Medicine, 540 E. Canfield Ave., Detroit, MI 48201). *Am. J. Dig. Lis.* 23(2):148-151; 1978.

6130 DILATATION OF BENIGN ESOPHAGEAL STRICTURES BY PERORAL FIBERENDOSCOPIC BOUGIENAGE. (Eng.) Huchzermeyer, H.; Freise, J.; Becker, H. (Medizinische Hochschule, Karl-Wiechert-Allee 9, 3000 Hannover 61, W. Germany). *Endoscopy* 9(4):207-210; 1977.

6131 NON-SURGICAL TREATMENT OF CARDIO-ESOPHAGEAL OBSTRUCTION--ROLE OF ENDOSCOPY. (Eng.) Tytgat, G. N.; den Hartog Jager, F. C. (Wilhelmina Gasthuis, Eerste Helmersstraat 104, Amsterdam Oud-West, Netherlands). *Endoscopy* 9(4): 211-215; 1977.

6132 THE ENDOSCOPIC PICTURE OF THE INTRAMURAL OESOPHAGEAL DIVERTICULOSIS. (Eng.) Minnigerode, B.; Bartholome, W.; Kupper, R. (Univ.-Hals-Nasen-Ohrenklinik, Hufelandstrasse 55, 4300 Essen, W. Germany). *Endoscopy* 9(4):203-207; 1977.

6133 ESOPHAGOBRONCHIAL FISTULA SECONDARY TO RUPTURED TRACTION DIVERTICULUM. (Eng.) Balthazar, E. J. (New York Medical Coll., 5th Ave. and 106th St., New York, NY 10029). *Gastrointest. Radiol.* 2(2):119-121; 1977.

See also, 5871, 6056, 6057, 6058, 6073, 6081, 6141, 6145, 6147, 6156, 6163, 6200, 6204, 6458, 6467, 6468, 6506, 6508, 6525, 6540, 6543.

STOMACH

6134 RETAINED GASTRIC ANTRUM SYNDROME DIAGNOSED BY [^{99m}Tc]PERTECHNETATE SCINTIPHOTOGRAPHY. IN MAN: HORMONAL AND RADIOISOTOPIC STUDY OF TWO CASES. (Eng.) Sciarretta, G.; Malaguti, P.; Turba, E.; Fini, A.; Verri, A.; Garagnani, B.; *et al.* (Via Oslavia, 5-40133, Bologna, Italy). *J. Nucl. Med.* 19(4):377-380; 1978.

To improve the differential diagnosis between gastrinoma and retained antrum syndrome (a rare condition, occurring in Billroth II (BII) gastrectomized patients, in which an ulcer recurs associated with high levels of circulating gastrin), two cases of retained antrum syndrome were studied both by gastrin tests (secretin, calcium, protein meal, and bombesin tests) and by [^{99m}Tc]pertechnetate scintiphotography. By the latter method, a prominent area of activity was observed on the anatomic site of the duodenal stump bottom. It appeared after 20 or 30 min and lasted for the 2 hr of observation. After surgical resection, no area of activity was observed at the scintiphotographic follow-up. No false-positive was observed in the more than 30 subjects studied. Scintiphotography by pertechnetate seems able to demonstrate the presence and the size of retained gastric antrum in BII gastrectomized patients with recurrent ulcer.

6135 PROGRESS IN THE CYTOLOGICAL DIAGNOSIS OF GASTRIC LYMPHOMA. (Eng.) Cabre-Fiol, V.; Vilardell, F. (Hospital Santa Cruz y San Pablo, Barcelona 13, Spain). *Cancer* 41(4):1456-1461; 1978.

Experience with 32 cases of gastric lymphoma examined cytologically is reviewed to compare two techniques of diagnosis. In one series (1953-1972), a technique combining washings and abrasion under fluoroscopic control was used. A positive diagnosis of malignancy was made in 7 of 17 cases. In a recent series (1972-1976), 15 cases of gastric lymphoma were studied by direct abrasion during endoscopy. Malignant cells were identified in 13 cases and a correct diagnosis of lymphoma was made in 11 cases. Biopsy was positive for malignancy in 12 cases and lymphoma was specifically diagnosed in 9 instances. Combining cytology and biopsy, a diagnosis of cancer was made in 14 of 15 cases. Endoscopic cytology appears to be far superior to blind abrasion and washings techniques in the diagnosis of lymphoma of the stomach.

6136 IMMUNOLOGICAL STUDIES IN CHRONIC ATROPHIC GASTRITIS AND CHRONIC (SUPERFICIAL) GASTRITIS. (Eng.) Fung, W. P.; Rigby, R. J.; Trenchev, P.; Matz, L. R. (Royal Perth Hosp., Box X2213 GPO, Perth, Western Australia 6001, Australia). *Am. J. Gastroenterol.* 69(1):51-56; 1978.

Detection of autoantibodies, histocompatibility locus antigen (HLA) typing, and immunofluorescence studies on gastric biopsies were carried out in 19 subjects with histologically proven chronic atrophic gastritis (CAG) or chronic superficial gastritis (CG), to clarify the immunological status of gastritis. All patients were seronegative for parietal cell antibody and did not have pernicious anemia. Except for positive antismooth muscle and antimitochrondial antibodies in one patient with CAG, autoantibodies (antinuclear, smooth muscle, mitochrondrial, parietal cell) were absent in patients with CAG and CG. Immunofluorescence studies showed that IgG and IgA were present in the lamina propria of all patients with CAG or CG and of subjects with normal gastric histology. IgM was seen less often, in about half the cases. Complement component C3 was an uncommon finding, being positive only in one case with CAG and one case with CG and in none of the cases with normal gastric histology. Fibrinogen was more commonly seen in patients with CG (5/5 cases) than in those with CAG (3/11 cases). Fibrinogen was found in one patient with normal gastric histology. The most consistent fluorescence was obtained with antiparietal cell antiserum. All subjects with CAG showed negative or weak staining only. In contrast, subjects with CG and normal gastric histology had strong specific fluorescence. An increased frequency of HLA-A1 plus HLA-B8 was found in subjects with CAG (20.7% in controls, 40%

in CAG). The staining pattern in cases of CAG and CG does not suggest immune complex-mediated disease. The presence of fibrinogen and occasionally of C3 supports the idea that the staining is secondary to inflammation.

6137 DIFFUSE VARIOLIFORM GASTRITIS. (Eng.) Lambert, R.; Andre, C.; Moulinier, B.; Bugnon, B. (Hopital E.-Herriot, F-69374 Lyon Cedex 2, France). *Digestion* 17(2):159-167; 1978.

A description of diffuse varioliform gastritis (DVG), a subacute gastric disease characterized by large folds in the fundus and erosive mucosal bulgings disseminated in the fundus and antrum, is presented based on 90 cases of DVG documented during 8 yr (0.3% of examinations). Samples of the fundic and antral mucosae were taken in each patient, along with a fiber endoscopic exploration of the stomach. Epigastric pain simulating peptic ulcer was observed in 63 patients, whereas other patients experienced chronic dull cramps. Twenty-eight patients experienced dyspepsia with anorexia and nausea, 47 patients showed weight loss, and 2 patients had gastrointestinal bleeding. In 67 of the 75 patients who underwent gastric radiological examination, an abnormal pattern was detected showing thick longitudinal folds present in the stomach but not in the antrum, as well as erosive polypoid lesions. Endoscopy showed large folds in the stomach in all patients and extension of the antrum in 74. Microscopic examination showed an increased length of gastric pits, a marked increase of IgE cells, and an eightfold increase in immunocytes per mucosal tissue unit in the fundus and the antrum. Symptoms often appeared suddenly and persisted 1-3 months with quiescent periods of 3 months to 3 yr. The evolution of DVG was followed in 52 patients for 1-5 yr: 15 healed, 28 improved, 8 were unchanged, and 1 worsened. Therapy involving sodium cromoglycate (80-160 mg/day before meals for one month) relieved the symptoms in the seven patients tested; H_2 receptor antagonists (1 g/day) were also found to be effective in the five patients tested.

6138 PROLONGED TREATMENT OF MENETRIER'S DISEASE WITH AN ORAL ANTICHOLINERGIC DRUG. (Eng.) Smith, R. L.; Powell, D. W. (Univ. North Carolina Sch. Medicine, Chapel Hill, NC 27514). *Gastroenterology* 74(5, Part 1):903-906; 1978.

Long-term, high-dose, p.o. anticholinergic drug therapy with propantheline bromide (15 mg/every meal and 30 mg at bedtime, increased over 1 month to 105 mg on a divided-dose schedule maintained for 9 months) was evaluated to determine its effect on gastric plasma protein shedding in a patient with Menetrier's disease. Serial measurements of serum protein components were performed before, during, and after long-term treatment with propantheline bromide. Total serum protein concentration increased significantly ($p<0.02$) during the treatment period from 4.3 ± 0.25 to 5.9 ± 0.55 g/dl during treatment, while albumin increased from a pretreatment value of 2.5 ± 0.12 to 3.4 ± 0.16 g/dl ($p<0.005$). The peripheral edema resolved after 2 months of therapy. The only side-effects were dryness of the mouth and mild urinary symptoms. The improvement in serum protein levels and in symptoms (epigastric tenderness and gnawing epigastric discomfort) continued after therapy was stopped; the serum protein and albumin levels have remained at treatment levels for 6 months. Intensive anticholinergic drug therapy should be tried in this disease before resorting to gastrectomy.

6139 "FOLATE-LOSING GASTROPATHY" AND INTESTINAL FOLATE ABSORPTION IN PATIENTS WITH MENETRIER'S DISEASE (GIANT HYPERTROPHIC GASTRITIS). (Eng.) Belaiche, J.; Matuchansky, C.; Zittoun, J.; Rambaud, J. C.; Bernier, J. J.; Cattan, D. (Hopital de Villeneuve-Saint-Georges, Creteil, France). *Am. J. Dig. Dis.* 23(2):143-147; 1978.

The finding of a decreased serum folate concentration in four patients with Menetrier's disease (MD) led to an investigation of folic acid loss into the gastric lumen concurrently with the intestinal absorption of folate. In each case, there was an increased gastric clearance of plasma proteins, as demonstrated by ^{51}Cr-labeled albumin tests. All the patients had a low serum level of folate and a flat curve of serum folate concentrations after an oral load of folic acid. The gastric loss of folate was determined in the patients and in five controls from the folate concentrations (before and after an i.v. injection of folinic acid) in basal and histamine-stimulated gastric secretion. A significant increase in concentrations and outputs of folate in gastric juice was observed in MD patients compared to controls ($p<0.001$), before as well as after gastric stimulation. None of the patients had abnormalities in jejunal morphology or in xylose absorption. This study shows that folic acid should be added to the list of serum components that may be lost in excess into the gastric lumen in MD patients. The responsibility of this "folate-losing gastropathy" in the folate deficiency that may be observed in MD patients has to be discussed in relation to associated abnormalities in small intestinal folate transport.

6140 GASTRIC MUCOSAL PERMEABILITY AND GASTRIC ACID SECRETION BEFORE AND AFTER HEMODIALYSIS IN PATIENTS WITH CHRONIC RENAL FAILURE. (Eng.) Shapira, N.; Skillman, J. J.; Steinman, T. I.; Silen, W. (Harvard Medical Sch., Boston, MA). *Surgery* 83(5):528-535; 1978.

Gastric mucosal permeability and gastric acid secretion were assessed in 16 patients in chronic renal failure before and after maintenance hemodialysis and in 13 normal healthy subjects by the acid-free lithium-polyethylene glycol technique. Half of the uremic patients had increased gastric mucosal permeability (IGMP) before dialysis in comparison with the normal control subjects ($p<0.001$) A significant improvement in gastric mucosal permeability ($\Delta[Li^+/PEG]$) occurred in the IGMP group after dialysis ($p<0.025$). Decreases in systolic

blood pressure during hemodialysis were correlated with increases in gastric mucosal permeability ($r=0.72$, $p<0.01$). Gastric acid secretion ($\Delta[H^+/PEG]$) was significantly lower ($p<0.001$) in the uremic patients than in normal subjects, but was increased toward normal levels after dialysis. There was a linear correlation between changes in gastric acid secretion and the secretion of pepsin (Δ[pepsin/PEG]) in uremic patients before and after hemodialysis ($r=0.77$, $p<0.001$). Serum gastrin concentrations were markedly elevated in uremic patients (608 ± 189 and 331 ± 137 pg/ml in patients with normal and increased mucosal permeability, resp.) and were unaffected by dialysis. It is possible that the constellation of high serum gastrin levels, abnormal gastric mucosal permeability, and restoration of gastric acid secretion toward more normal levels after dialysis in patients with chronic uremia are related to the increased incidence of gastroduodenal ulceration that has been reported to occur in these patients.

6141 ALKALINE GASTROESOPHAGEAL REFLUX. (Eng.) Pellegrini, C. A.; DeMeester, T. R.; Wernly, J. A.; Johnson, L. F.; Skinner, D. B. (Univ. Chicago Pritzker Sch. Medicine, 950 E. 59th St., Chicago, IL 60637). *Am. J. Surg.* 135(2):177-184; 1978.

To determine the significance of alkaline secretions in the development of reflux esophagitis, the relationship between acid and alkaline reflux was studied in patients with symptoms of reflux and controls, using 24-hr pH monitoring of the distal esophagus. The upper level of physiologic reflux was determined from the percentage of time and the number of episodes during which the pH was <4 or >7 and the mean duration of each episode in 15 asymptomatic subjects. One hundred patients with symptoms of gastroesophageal reflux were divided into four groups on the basis of 24-hr pH monitoring: those with abnormal acid but normal alkaline reflux (termed acid refluxers, 51 patients), those with both abnormal acid and alkaline reflux (termed acid-alkaline refluxers, 25), those with normal acid and abnormal alkaline reflux (termed alkaline refluxers, 6), and those with both normal acid and alkaline reflux (termed nonrefluxers, 18). Nonrefluxers had a similar incidence of heartburn, regurgitation, and dysphagia as did acid and acid-alkaline refluxers, proving the inaccuracy of symptoms for detecting reflux. Alkaline refluxers had a lesser incidence of heartburn but a greater incidence of regurgitation, and four alkaline reflux patients presented with severe pulmonary disease secondary to aspiration. Similar incidence and degree of esophagitis was seen in acid, acid-alkaline, and alkaline refluxers. All three groups of symptomatic refluxers had a mean distal esophageal sphincter pressure (DESP) significantly lower than that of the controls ($p<0.02$). There was no difference in the DESP between controls and symptomatic nonrefluxers. Nine patients with acid-alkaline reflux and one patient with alkaline reflux underwent an antireflux procedure and were restudied 3 months postoperatively. All 10 patients had a 24-hr pH acid score within normal limits, but two had an abnormal 24-hr pH alkaline score. In both patients, reflux was demonstrated after placing an acid load in the stomach. It is concluded that symptomatic gastroesophageal reflux in patients with an intact gastrointestinal tract is a mixture of both acid and alkaline secretions, with one or both being abnormal due to different degrees of acid production and pyloric regurgitation. Patients with alkaline reflux may develop serious complications of reflux in the absence of typical symptoms of heartburn. Twenty-four hour pH monitoring of the esophagus is useful in the identification of these patients and in evaluating the ability of an antireflux procedure to control both abnormal acid and alkaline reflux.

6142 SERUM CARBENOXOLONE IN PATIENTS WITH GASTRIC AND DUODENAL ULCER: ABSORPTION, EFFICACY AND SIDE EFFECTS. (Eng.) Baron, J. H.; Gribble, R. J. N.; Rhodes, C.; Wright, P. A. (Hammersmith Hosp., London W12 OHS, England). *Gut* 19 (4):330-335; 1978.

The absorption of carbenoxolone sodium was studied in 15 patients with gastric ulcer and 8 patients with duodenal ulcer treated for four weeks, and the results were correlated with clinical, endoscopic, and metabolic responses. The gastric ulcer patients were treated with Biogastrone: 9/15 received 100 mg on day 1 and 100 mg 3 times/day on days 2-28 and 6/15 received 100 mg on day 1, 100 mg 3 times/day on days 2-7, and 50 mg 3 times/day on days 8-28. The duodenal ulcer patients were treated with Duogastrone (50 mg on day 1 and 50 mg 4 times/day on days 2-28). Blood levels of carbenoxolone showed a log distribution, varied markedly between patients, and were markedly higher after Biogastrone tablets than after Duogastrone capsules. Serum carbenoxolone levels were similar in patients taking Biogastrone tablets before or after meals, and in patients taking Biogastrone tablets or Duogastrone capsules with or without antacids following chronic administration. Serum carbenoxolone levels were similar in patients whose gastric ulcers had or had not healed after 4 weeks of treatment. Serum carbenoxolone was significantly higher in patients who developed edema ($p<0.04$-0.06) and was significantly correlated with age ($r=0.57$, $p<0.03$) and with fall in plasma potassium ($r=0.69$, $p<0.0005$). Carbenoxolone may exert its metabolic effects systemically but its ulcer-healing effects topically; additional studies are needed to test this hypothesis.

6143 CIMETIDINE AND PLACEBO IN THE TREATMENT OF BENIGN GASTRIC ULCER: A MULTICENTER DOUBLE BLIND STUDY. (Eng.) Dyck, W. P.; Belsito, A.; Fleshler, B.; Liebermann, T. R.; Dickinson, P. B.; Wood, J. M. (Scott and White Memorial Hosp., Temple, TX). *Gastroenterology* 74(2):410-415; 1978.

A randomized, prospective, multicenter trial of the effects of cimetidine on benign gastric ulcer was conducted in 60 out-patients. Healing was assessed endoscopically. Although none of the differences was statistically significant, mean healing rates were higher and mean decreases in ulcer size were greater with cimetidine than they were with placebo.

Twenty-four percent of the ulcers healed completely in 2 weeks when cimetidine (300 mg 4 times/day) was administered, compared with a placebo healing rate of 14%. At 6 weeks, the incidence of healing increased to 60% in the cimetidine group and 41% in the placebo group. The mean percentage of decrease in ulcer size was greater at both 2 and 6 weeks in the cimetidine group than it was in the placebo group. In both the cimetidine and placebo groups, relatively liberal intake of a potent antacid occurred, despite recommendations that antacid be taken only for ulcer pain and despite a reported low frequency of ulcer pain throughout the study. The role of potent antacids in treatment of gastric ulcers has not been defined definitively. Thus, a possible beneficial effect of cimetidine may have been obscured. For a more clear discrimination between the effects of cimetidine and placebo in the healing of gastric ulcer, studies utilizing either no antacid or antacids of low neutralizing capacity will be needed.

6144 CIMETIDINE, ANTACID, AND HOSPITALIZATION IN THE TREATMENT OF BENIGN GASTRIC ULCER: A MULTICENTER DOUBLE BLIND STUDY. (Eng.) Englert, E., Jr.; Freston, J. W.; Graham, D. Y.; Finkelstein, W.; Kruss, D. M.; Priest, R. J.; *et al.* (Veterans Admin. Hosp., 500 Foothill Drive, Salt Lake City, UT 84148). *Gastroenterology* 74(2, Part 2):416-425; 1978.

A controlled clinical trial was carried out in 206 patients with benign gastric ulcer to assess the effect on healing of cimetidine, antacids, and hospitalization. In-patients and out-patients were randomly assigned to one of three treatments: cimetidine plus antacid, cimetidine plus dummy antacid, or placebo tablet plus antacid. Ulcer healing as shown by endoscopy occurred by 12 days in 11-26% and by 42 days in 58-76% of the patients. There were no significant differences in healing between hospitalized and nonhospitalized patients or between treatment subgroups. Symptomatic response was equivalent in all groups. The median antacid consumption was 328 mEq of *in vitro* buffering capacity daily. Patients taking antacids experienced significant ($p<0.01$) diarrhea compared with those taking no antacid. This investigation suggests that the effect of cimetidine is equivalent to that of large amounts of antacid, but because a true placebo group was not studied, it is not possible to conclude from this study alone whether either agent influenced healing. In contrast to widespread belief, initiation of treatment in the hospital did not enhance healing, but because patients were not randomly assigned to in-patient and outpatient status, no final conclusion about the effect of hospitalization on healing can be drawn.

6145 ROUTINE TOTAL GASTRECTOMY FOR OPERABLE GASTRIC CANCER [Abstract]. (Eng./Ger.) Pichlmayr, R.; van Alste, H. E. (Medizinische Hochschule Hannover, Karl-Wiechert-Allee 9, D-3000 Hannover, W. Germany). *Langenbecks Arch. Chir.* 345:595; 1977.

6146 REASONS FOR POOR PROGNOSIS OF GASTRIC STUMP CARCINOMA IN COMPARISON TO PRIMARY STOMACH CARCINOMA [Abstract]. (Eng./Ger.) Radomsky, J.; Wacha, H.; Luders, L. (Krankenhaus Nordwest, Steinbacher Hohl 2/26, D-6000 Frankfurt 90, W. Germany). *Langenbecks Arch. Chir.* 345:597; 1977.

6147 ESOPHAGITIS AND ESOPHAGEAL STRICTURE AFTER TOTAL GASTRECTOMY [Abstract]. (Eng./Ger.) Turunen, M.; Hakkiluoto, A.; Kalima, T. (II. Chirurgische Universitats-Klinik, Helsinki, Finland). *Langenbecks Arch. Chir.* 345:596; 1977.

6148 NEW DIAGNOSTIC AND THERAPEUTIC ASPECTS IN TREATMENT OF SARCOMATOUS LESIONS OF THE STOMACH [Abstract]. (Eng./Ger.) Merkle, P.; Bultmann, B.; v. Gierke, S.; Schlag, P. (Abt. f. Chirurgie, Universitat Ulm, Steinhovelstr. 9, D-7900 Ulm-Safranberg, W. Germany). *Langenbecks Arch. Chir.* 345:598; 1977.

6149 MALIGNANT NONCARCINOMATOUS TUMORS OF THE STOMACH [Abstract]. (Eng./Ger.) Mannl, H. F. K.; Simonis, G.; Felsing, H. H.; Lindemann, M. (Chirurgische Universitatsklinik, D-6650 Homburg/Saar, W. Germany). *Langenbecks Arch. Chir.* 345: 597-598; 1977.

6150 GASTRIC ACID SECRETION CAPACITY BEFORE, AT 3 MONTHS AND AT 1 YEAR FOLLOWING PARIETAL CELL VAGOTOMY AND SELECTIVE GASTRIC VAGOTOMY [Abstract]. (Eng.) Ornsholt, J.; Parmeggiani, A.; Andersen, D.; Amdrup, E. (Kommunehospitalet, Aarhus, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):115; 1977.

6151 GLANDULAR CYSTS OF GASTRIC MUCOSA [Abstract]. (Eng.) Krentz, K.; Gohrband, G. (Luisenhospital, Aachen, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):487; 1977.

6152 EFFECT OF PHENFORMIN ON PROVOKED DUMPING IN MAN [Abstract]. (Eng.) Humphreys, W. G.; Parks, T. G.; Buchanan, K. D.; Love, A. H. G. (Dept. Surgery, Queen's Univ., Belfast, Northern Ireland). *Gut* 18(11):A956; 1977.

6153 POSTVAGOTOMY DIARRHOEA AND DUMPING TREATED WITH RECONSTRUCTION OF THE PYLORUS [Abstract]. (Eng.) Johansen, T. S.; Frederiksen, H. J.; Christiansen, P. M. (Hvidovre Hosp., Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):41; 1977.

6154 SERUM PEPSINOGEN I AS A SCREENING TEST FOR PERNICIOUS ANEMIA AND PERNICIOUS ANEMIA STATES [Abstract]. (Eng.) Siurala, M.; Samloff, I. M.; Varis, K.; Ihamaki, T. (Meilahti Hosp., Helsinki, Finland). *Scand. J. Gastroenterol.* 12 (Suppl. 45):98; 1977.

6155 FAMILY CHARACTERISTICS OF PERNICIOUS ANEMIA [Abstract]. (Eng.) Varis, K.; Ihamaki, T.; Isokoski, M.; Sipponen, P.; Kekki, M.; Lehtola, J.; Siurala, M. (Meilahti Hosp., Helsinki, Finland). *Scand. J. Gastroenterol.* 12(Suppl. 45):108; 1977.

6156 A NON-INVASIVE TEST OF GASTRIC FUNCTION [Abstract]. (Eng.) Taylor, T. V.; Bone, D.; Torrance, B. (Royal Infirmary, Manchester, England). *Gut* 18(11):A947; 1977.

6157 CIMETIDINE--AN ADVANCE IN GASTRIC ULCER TREATMENT [Abstract]? (Eng.) McAdam, W. A. F.; Morgan, A. G.; Pacsoo, C.; Walker, B. E.; Simmons, A. V. (Airedale General Hosp., Steeton, England). *Gut* 18(11):A987-A988; 1977.

6158 DIAGNOSIS OF RECURRENT CANCER OF THE GASTRIC STUMP. (Rus.) Khodzhimetov, A. K. (Dept. Roentgenology and Medical Radiology, Tashkent Medical Inst., Tashkent, USSR). *Khirurgiia (Mosk.)* (10):37-40; 1977.

6159 VILLOUS GASTRIC TUMORS. (Rus.) Lukinykh, A. K. (Div. Surgery, Ryazan Medical Inst., Ryazan, USSR). *Khirurgiia (Mosk.)* (10):28-35; 1977.

6160 RESULTS OF SURGICAL TREATMENT OF GASTRIC CANCER. (Rus.) Parakhonyak, V. I.; Leporskii, V. N. (Div. Surgery, S. M. Kirov Medical Inst., Gorki, USSR). *Khirurgiia (Mosk.)* (10):22-28; 1977.

6161 POSSIBILITIES OF SURGICAL MANAGEMENT OF GASTRIC CANCER IN LIGHT OF LONG-TERM RESULTS. (Rus.) Klimenkov, A. A.; Letyagin, V. P.; Tikhomirov, G. K.; Akhmetov, M. Sh.; Fokin, V. I.; Kadushev, B. K. (Center Oncological Science, Moscow, USSR). *Khirurgiia (Mosk.)* (10):17-22; 1977.

6162 IMMEDIATE RESULTS OF SURGICAL TREATMENT OF GASTRIC CANCER IN ELDERLY PATIENTS. (Rus.) Akimov, A. M.; Lisitskii, A. N. (P. A. Herzen Scientific Res. Oncology Center, Moscow, USSR). *Khirurgiia (Mosk.)* (10):14-17; 1977.

6163 ESOPHAGOENTEROSTOMY IN GASTRECTOMY. (Rus.) Vagner, E. A.; Artemov, O. T. (Dept. Clinical Surgery, Perm Medical Inst., Perm, USSR). *Khirurgiia (Mosk.)* (10):9-14; 1977.

6164 EARLY FORMS OF GASTRIC CARCINOMA. (Rus.) Malinovskii, N. N.; Voshchanova, N. P.; Kosarev, V. A. (No affiliation given). *Khirurgiia (Mosk.)* (10):3-9; 1977.

6165 ENDOSCOPIC DIAGNOSIS OF EARLY GASTRIC CANCER. (Rus.) Mansurov, Kh. Kh.; Kan, Ch.; Kaminskaya, G. A. (Inst. Gastroenterology, Acad. Science, Tadzhikistan, USSR). *Sov. Med.* (8):127-129; 1977.

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6178 THE INTESTINAL PHASE OF GASTRIC SECRETION: GASTRIN STUDIES FOLLOWING DUODENAL PERFUSION IN HUMANS [Abstract]. (Eng.) McLeish, A. R.; Hardy, K. J. (Austin Hosp., Melbourne, Australia). *Aust. N.Z. J. Surg.* 47(1):113; 1977.

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6181 THE RELATION BETWEEN SERUM AND ANTRAL GASTRIN CONCENTRATION IN PATIENTS WITH ACHLORHYDRIA [Abstract]. (Eng.) Hughes, W.; Brannan, M. (Univ. Texas Medical Branch, Galveston, TX). *Gastroenterology* 72(5, Part 2):1073; 1977.

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cuse, NY). *Gastroenterology* 72(5, Part 2):1122; 1977.

6193 HYPERGASTRINEMIA IN GASTRIC ULCER DISEASE [Abstract]. (Eng.) Hughes, W.; Shabot, M.; Van Deventer, G. (Univ. Texas Medical Branch, Galveston, TX). *Gastroenterology* 72(5, Part 2): 1073; 1977.

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6196 GASTRIC POLYPS OR EROSIONS [Letter to Editor]? (Eng.) Op den Orth, J. O.; Dekker, W. (St. Elisabeth's of Groote Gasthuis, Haarlem, Netherlands). *Am. J. Roentgenol.* 129(2): 357-358; 1977.

6197 ANATOMICAL AND FUNCTIONAL STUDY OF GASTRIC MUCOSA IN CHRONIC RENAL FAILURE [Abstract]. (Eng.) Salera, M.; Biasco, G.; Di Febo, G.; Baldi, F.; Miglioli, M.; Barbara, L. (Cattedra di Gastroenterologia dell'Universita, Bologna, Italy). *Rend. Gastroenterol.* 9(1):52-53; 1977.

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See also, 5899, 5914, 5915, 5916, 5921, 6042, 6045, 6056, 6057, 6058, 6073, 6081, 6084, 6096, 6097, 6100, 6102, 6103, 6108, 6113, 6115, 6116, 6117, 6120, 6121, 6122, 6123, 6124, 6125, 6127, 6129, 6200, 6204, 6206, 6207, 6212, 6226, 6364, 6392, 6458, 6497, 6506, 6508, 6509, 6510, 6512, 6518, 6524, 6525, 6533, 6535, 6540, 6543.

STOMACH

Peptic Ulcers

6199 MEASUREMENT OF GASTRIC MUCOSAL BLOOD FLOW IN MAN. (Eng.) Guth, P. H.; Baumann, H.; Grossman, M. I.; Aures, D.; Elashoff, J. (691/111C Veterans Admin. Wadsworth Hosp. Center, Wilshire and Sawtelle Blvd., Los Angeles, CA 90073). *Gastroenterology* 74(5, Part 1):831-834; 1978.

To determine whether the ^{14}C-aminopyrine (AP) clearance technique can be used to measure gastric mucosal blood flow in man and, if so, whether the ratio of blood flow to acid secretion is different in duodenal ulcer (DU) patients than in normal subjects, the clearance of ^{14}C-AP from plasma into gastric juice was studied in five normal men and five men with duodenal ulcer during the infusion of stepwise increasing doses of pentagastrin (25-2,000 ng/kg/hr). Acid secretion in response to high doses of pentagastrin (222, 666, and 2,000 ng/kg/hr) was significantly greater ($p<0.05$) in DU patients than in normal subjects. For each dose of pentagastrin, the ^{14}C-AP clearance rate increased in both normal and DU subjects, and its mean rate of clearance was always greater in DU subjects, though the difference was not statistically significant. There was a significant correlation between rate of acid secretion and clearance of ^{14}C-AP in both the normal subjects ($r=0.76$) and the DU patients ($r=0.71$), and the slopes and intercepts of the lines relating these two variables did not differ significantly between the two groups. Similarly, R, the ratio of gastric juice to plasma AP concentrations, which is also a measure of the milliliters of blood flow for each milliliter of juice secreted, showed a negative correlation with rate of acid secretion in both DU patients and normal subjects, and the slopes and intercepts of the lines relating R to acid secretion did not differ significantly between the two groups. The relation between acid secretion and clearance of ^{14}C-AP in man is similar to that found in earlier studies in dog, a species in which clearance of AP has been shown to be a valid measure of mucosal blood flow. It is concluded that clearance of ^{14}C-AP from plasma into gastric juice appears to be a valid measure of mucosal blood flow in man and that the relationship between rate of acid secretion and clearance of ^{14}C-AP is similar in normal subjects and in patients with DU.

6200 EFFECT OF BILE ACIDS AND pH ON THE RELEASE OF ENTEROPEPTIDASE IN MAN. (Eng.) Rin-

derknecht, H.; Nagaraja, M. R.; Adham, N. F. (Veterans Admin. Hosp., Sepulveda, CA 91343). *Am. J. Dig. Dis.* 23(4):332-336; 1978.

Because bile acids increase the release of the human brush border enzymes enteropeptidase (EP), alkaline phosphatase (AP), and leucine aminopeptidase (LAP) from duodenal mucosa and because the action of bile acids is independent of their known enhancing effect on enteropeptidase activity, the effects of glycodeoxycholate and pH on the release of these three enzymes was studied in human duodenal biopsies to clarify the kinetics of the release. Glycodeoxycholate (2.5 mM) enhanced the release of both EP and AP (expressed as percent total enzyme/g wet tissue) at both pH 6.3 and pH 8.2 ($p<0.001$ and $p<0.004$ for EP and AP, resp., at pH 6.3; $p<0.002$ for both EP and AP at pH 8.2). However, both EP and AP were released to a greater extent at pH 8.2 than at pH 6.3 in the absence of bile acid (15.4 ± 2.8% at pH 6.3 versus 36.2 ± 6.3% at pH 8.2, $p<0.005$, for EP; 5.2 ± 0.7% at pH 6.3 versus 14.4 ± 3.4%, $p<0.005$ for AP), the enhancement being comparable to that produced by glycodeoxycholate on either enzyme at either pH. Contrary to some results obtained with animal tissue by other investigators, these experiments with human duodenal mucosa indicate that EP, under all conditions tested, is released at a rate considerably greater than that for AP or LAP. The looser association of EP with cellular components relative to that of other brush border enzymes, as indicated by the observations, may be related to the unique function of EP as the trigger enzyme of protein digestion. The pH of duodenal juice is a hitherto unrecognized factor in the release mechanism of brush border enzymes.

6201 INTESTINAL PHASE OF GASTRIC SECRETION IN PATIENTS WITH DUODENAL ULCER. (Eng.) Konturek, S. J.; Kwiecien, N.; Obtulowicz, W.; Sito, E.; Oleksy, J. (Inst. Physiology, 16 Grzegorzecka St., 31-531 Krakow, Poland). *Gut* 19(4):321-326; 1978.

Studies were carried out to establish the existence of the intestinal phase of gastric secretion in man and to compare it in healthy subjects and duodenal ulcer patients. In 10 healthy subjects and 10 duodenal ulcer patients, the intestinal phase of gastric acid secretion was studied by intraduodenal infusion of a 10% liver extract meal (pH 7) at 400 ml/hr for 3 hr. A gastroduodenal double-lumen tube with two balloons was used to block the pylorus and to prevent duodenogastric reflux. Gastric acid response to a duodenal meal of liver extract reached a peak at the end of the first hour of infusion of the extract and was then followed by a relatively well-sustained plateau. When the figure was normalized as a percentage of peak response to pentagastrin, it was about 45% in healthy subjects and 63% ($p<0.05$) in duodenal ulcer patients. Serum gastrin concentration increased significantly ($p<0.05$) during a duodenal meal of liver extract only in duodenal ulcer patients and not in healthy subjects. The combination of the duodenal meal of liver extract with pentagastrin infusion resulted in a significantly greater ($p<0.05$) increase in acid output in duodenal ulcer patients than in healthy controls. Duodenal perfusion with a liver extract meal in which the pH was gradually decreased caused a pH-dependent reduction in acid output, but not in serum gastrin, both in the duodenal ulcer patients and in healthy subjects. This study shows that the intestinal phase in man results in a potent gastric acid stimulation that is pH-dependent, greatly augmented by pentagastrin, and more vigorous in duodenal ulcer patients than in healthy controls.

6202 GIANT DUODENAL ULCERS. (Eng.) Eisenberg, R. L.; Margulis, A. R.; Moss, A. A. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Gastrointest. Radiol.* 2(4):347-353; 1978.

To improve the diagnosis of and reduce the mortality from giant duodenal ulcers, clinical, radiological, and therapeutic results from 26 patients with giant duodenal ulcers are reviewed. The concept of the ulcer/bulb ratio (ratio of longest diameter of the ulcer to that of the total bulb including the ulcer) is introduced. In all cases this ratio was 0.8 or greater; in 18 cases, the ulcer completely replaced the duodenal bulb. An "ulcer within an ulcer" appearance, representing a small area of deeper ulceration within the giant ulcer, was noted in 8 cases. Half of the patients have remained symptom-free on medical therapy alone. Only two patients in the series died of complications of giant duodenal ulcer (one of hypovolemic shock 6 weeks postoperatively, one of massive hemorrhage shortly after admission). Five of the six patients requiring surgical intervention did well after surgery. It is suggested that a course of intensive medical therapy be attempted prior to surgical intervention.

6203 PROPHYLACTIC EFFECT OF CIMETIDINE IN DUODENAL ULCER DISEASE. (Eng.) Gudmand-Hoyer, E.; Jensen, K. B.; Krag, E.; Rask-Madsen, J.; Rahbek, I.; Rune, S. J.; *et al.* (Herlev Univ. Hosp., 2730 Herlev, Denmark). *Br. Med. J.* 1(6120):1095-1097; 1978.

Fifty-seven symptom-free patients with duodenal ulcer entered a double-blind trial to assess the prophylactic effect of cimetidine. Patients were randomly allocated to receive cimetidine (400 mg b.i.d., 29 patients) or placebo (28 patients). The trial was designed to imitate daily clinical practice, so duodenal ulcer disease was diagnosed by means of x-ray examination. Three patients from each group withdrew from the trial. All remaining patients continued to receive treatment for 12 months or until symptoms recurred. Three of 28 patients suffered relapses during cimetidine treatment, compared with 20 of 25 receiving placebo. No side-effects were attributable to cimetidine. Long-term cimetidine treatment had no curative effect as relapses occurred soon after treatment was stopped. The estimated chance (cumulative remission rate ±2 SE) of remaining symptom-free for 13 weeks after 1 yr of cimetidine treatment was 47 ± 21%. Maintenance treatment with cimetidine is a suitable alternative

to elective surgery in patients with duodenal ulcer subject to frequent relapses. Further study is needed to establish the optimal duration and safety of prolonged cimetidine treatment.

6204 SECRETION OF INTRINSIC FACTOR AND HYDROCHLORIC ACID AFTER 12 WEEKS' TREATMENT WITH CIMETIDINE. (Eng.) Epstein, O.; Judelman, J.; Bevan, G.; Ardeman, S. (Royal Free Hosp., London, England). *Gut* 19(4):327-329; 1978.

The effect of cimetidine on intrinsic factor and HCl production was studied in patients undergoing treatment for 12 weeks. A sample of 16 patients had pentagastrin stimulation studies performed before starting the 12-week course of cimetidine, and again 12 hr after completing the course. Basal and pentagastrin-stimulated intrinsic factor secretion was assayed in 13 patients. There was no significant difference in the pattern of secretion after 12 weeks of cimetidine treatment. The basal and peak acid outputs of all 16 patients were measured. No significant difference was found in the pattern of acid secretion after treatment. It appears that parietal cell secretory function is restored to normal within 12 hr of discontinuing a prolonged course of cimetidine.

6205 DIFFERENTIAL DIAGNOSIS OF PEPTIC ULCER OF THE STOMACH BY ENDOSCOPY AND BIOPSY. (Hun.) Gyorffy, A.; Krajczar, G.; Kiss, B.; Varhelyi, I. (II. Belgyogyaszati Klinika, Debreceni Orvostudomanyi Egyetem, Debrecen, Hungary). *Orv. Hetil.* 118(49):2943-2948; 1977.

6206 EPIDEMIOLOGY OF ULCER. (Ger.) Wursch, T. G.; Walser, R.; Hess, H.; Koelz, H. R.; Pelloni, S.; Sonnenberg, A.; *et al.* (Stadtspital Triemli, CH-8063 Zurich, Switzerland). *Z. Gastroenterol.* 15(10):625; 1977.

6207 ULCER IN CHILDREN. (Nor.) Kovdad, A. (Gjovik fylkessykehus, Kirurgisk avdeling, Gjovik, Norway). *Tidsskr. Nor. Laegeforen.* 97(22): 1079-1080; 1977.

6208 GENETICALLY DETERMINED RISK FACTORS FOR PEPTIC ULCER DEVELOPMENT. (Rus.) Frolkis, A. V.; Somova, E. P. (Propedeutic Dept. Internal Medicine, O. V. Kuusinen Petrozavodsk Univ., Petrozavodsk, USSR). *Ter. Arkh.* 49(6):90-93; 1977.

6209 PROTEOLYTIC ACTIVITY OF GASTRIC JUICE IN PEPTIC ULCER AND CHRONIC GASTRITIS--POSSIBILITY OF ITS PHARMACOLOGICAL CORRECTION. (Rus.) Tsimmerman, Ia. S. (Dept. Therapy, Perm Medical Inst., Perm, USSR). *Klin. Med. (Mosk.)* 54(7):63-68; 1976.

6210 PROPHYLACTIC TREATMENT OF PEPTIC ULCER. (Rus.) Samson, E. I. (Dept. Therapy, Chernovtsy Medical Inst., Chernovtsy, USSR). *Klin. Med. (Mosk.)* 45(10):112-116; 1977.

6211 EFFECT OF VARIOUS MIXTURES OF ANTICHOLINERGIC DRUGS ON THE FUNCTIONAL STATUS OF THE CIRCULATORY SYSTEM IN PEPTIC ULCER PATIENTS. (Rus.) Ivanova, E. A. (Dept. Therapy, Kiev Medical Inst., Kiev, USSR). *Vrach. Delo* (10):108-111; 1977.

6212 CIMETIDINE: THERAPEUTIC PROSPECTS OF HISTAMINE H_2-RECEPTOR INHIBITORS. (Fre.) Bonfils, S.; Rene, E. (INSERM U-10, Hopital Bichat, 170, boulevard Ney, 75877 Paris Cedex 18, France). *Rev. Prat.* 27(36):2321-2322; 1977.

6213 FACTS ON THE THERAPEUTIC EFFECTIVENESS OF CIMETIDINE IN PEPTIC ULCER TREATMENT. (Ger.) Malchov, H.; Sewing, K. F. (Medizinische Universitatsklinik, Otfried-Muller-Str. 10, D-7400 Tubingen, W. Germany). *Internist (Berlin)* 18(12): 650-656; 1977.

6214 CIMETIDINE THERAPY OF DUODENAL ULCER. (Ger.) Pelloni, S.; Koelz, H. R.; Blum, A. L. (Stadtspital Triemli, CH-8063 Zurich, Switzerland). *Z. Gastroenterol.* 15(10):624; 1977.

6215 ENDOSCOPIC FOLLOW-UP DUODENAL ULCER FOLLOWING FOUR WEEKS OF CIMETIDINE TREATMENT. (Ger.) Molinari, F.; Turello, V.; Giacosa, A.; Ciancamerla, G.; Cheli, R. (Ospedali Civili di Genova, Genova, Italy). *Z. Gastroenterol.* 15(10): 622-624; 1977.

6216 DIMECOUMARONE--A NEW ANTI-ULCER DRUG. (Rus.) Mirzoian, S. A.; Nazaretian, R. A. (Dept. Pharmacology, Erevan Medical Inst., Erevan, USSR). *Zh. Eksp. Klin. Med.* 17(4):3-10; 1977.

6217 UNSKIMMED MARE'S MILK IN THE TREATMENT OF PATIENTS WITH GASTRODUODENAL ULCER. (Rus.) Zhangabylov, A. K.; Salkhanov, B. A. (Kazakh Branch, Inst. Nutrition, USSR Acad. Medical Sciences, Alma-Ata, USSR). *Vopr. Pitan.* (3):52-54; 1977.

6218 VITAMIN SUPPLY OF PEPTIC ULCER PATIENTS. (Rus.) Ivancho, E. S.; Sabov, V. A.; Shchetka, M. P.; Primich, E. I. (Zakarpat'e Oblast Public Health and Epidemiology Station, Uzhgorod, USSR). *Vrach. Delo* (7):70-71; 1977.

See also, 6073, 6081, 6102, 6103, 6108, 6142, 6150, 6156, 6157, 6177, 6241, 6506, 6524.

6219 IN VIVO METABOLISM OF PLASMA FREE FATTY ACIDS BY INTESTINAL MUCOSA OF MAN. (Eng.) Gangl, A.; Renner, F. (II. Universitatsklinik fur Gastroenterologie und Hepatologie, Garnisongasse 13, A-1090 Vienna, Austria). *Gastroenterology* 74(5): 847-850; 1978.

Because the free fatty acid (FFA) supply to the intestinal mucosa has two sources (the gut lumen and the plasma pool) and because the FFA from these sources have different metabolic fates, the metabolism of plasma FFA was studied in the mucosa of the upper jejunum in 12 patients *in vivo*. After rapid i.v. injection of ^{14}C-palmitic acid complexed to human albumin, serial jejunal biopsies were performed with a hydraulic biopsy tube. Specimens of jejunal mucosa were homogenized and assayed for lipids and radioactivity. The mean half-time of initial ^{14}C-FFA disappearance from plasma was 2.0 min. Uptake of ^{14}C-plasma FFA by the mucosa of the entire small bowel was estimated as 0.7%. Of mucosal radioactivity, 25.2% was recovered in water-soluble metabolites, suggesting local oxidation of plasma FFA; 31.7% was incorporated into phospholipids, 16.5% into triglycerides, and 9.7% was esterified with cholesterol. The specific activity of mucosal triglyceride-fatty acids was about 10-fold higher than the specific activity of serum triglyceride-fatty acids during the first 15 min after the i.v. injection of ^{14}C-palmitate, thereby establishing for the first time in man *in situ* esterification of plasma FFA by intestinal mucosa. It is therefore concluded that in man, plasma FFA also serve as a constantly available source of energy and of precursors for more complex lipids in the absorptive intestinal epithelium. It is speculated that, as in rats, part of the ester lipid synthesized *in situ* from plasma FFA may subsequently leave the absorptive cells incorporated in lipoproteins. Quantitatively this pathway must be minute, however, under normal conditions.

6220 PRIMARY MALIGNANT TUMORS OF THE SMALL INTESTINE. A TWENTY-TWO YEAR EXPERIENCE WITH THIRTY PATIENTS. (Eng.) Sager, G. F. (7 Bramhall St., Portland, ME 04102). *Am. J. Surg.* 135(4):601-603; 1978.

A review of 30 cases of primary malignant small bowel tumors is presented. Chronic obstruction was the presenting symptom most frequently encountered (13 patients), with an acute abdomen from perforation of the tumor next in frequency (6 patients). Adenocarcinoma (14 patients) and carcinoid (12 patients) were the most frequent findings, and more than half of all tumors (16/30) were found in the ileum. Five of 30 patients survived: 3 are alive and well and 2 are alive on chemotherapy. Five of these died of other causes. Of 27 patients explored for symptomatic small bowel cancers, only 1 is alive free of tumor. Malignant small bowel tumors are difficult to diagnose early and have a poor prognosis.

6221 PRIMARY LYMPHOMAS OF THE GASTROINTESTINAL TRACT. I. PLASMA CELL TUMOURS. (Eng.) Henry, K.; Farrer-Brown, G. (Westminster Medical Sch., London, England). *Histopathology* 1(1):53-76; 1977.

The histology of 125 cases of primary gastrointestinal lymphomas arising in the stomach and small and large intestines is reviewed. The material was gathered from the Bland-Sutton Institute of Pathology at the Middlesex Hospital and from the Westminster Hospital. Of the initial total of 143 cases diagnosed, 18 were rejected. Of the acceptable 125 cases, 51 lymphomas arose in the stomach, 53 in the small intestine, and 21 in the large intestine including the rectum. Excluding the four children in the series, ages ranged from 18 to 82 and were fairly evenly distributed across the decades. There was no significant sex difference in the Middlesex Hospital cases, but in the Westminster Hospital series, the male to female ratio was approximately 2.6 to 1. One significant finding to emerge from this histological survey, and that forms the basis of this communication, is the proportion of lymphomas considered to be predominantly of plasma cell type. These plasma cell tumors, or extramedullary plasmacytomas, accounted for 49 of the 125 cases of gastrointestinal lymphomas. They were less common in the stomach and most common in the intestine, the majority occurring in the ileocecal region. Conversely, Hodgkin's disease, in contrast to some series, was not encountered. Of the non-Hodgkin's lymphomas, grade I tumors were uncommon, and true histiocytic lymphomas were distinctly rare. The high incidence of plasma cell tumors in this series is in keeping with the morphological findings of a previous study carried out in patients with alpha-chain disease and in a small series of primary gastrointestinal lymphomas.

6222 "MEDITERRANEAN ABDOMINAL LYMPHOMA" OR IMMUNOPROLIFERATIVE SMALL INTESTINAL DISEASE. PART II: PATHOLOGICAL ASPECTS. (Eng.) Nassar, V. H.; Salem, P. A.; Shahid, M. J.; Alami, S. Y.; Balikan, J. B.; Salem, A. A.; *et al.* (Grady Memorial Hosp., 80 Butler St., S.E., Atlanta, GA 30303). *Cancer* 41(4):1340-1354; 1978.

The pathology of 25 cases of Mediterranean abdominal lymphoma, better designated as immunoproliferative small intestinal disease (IPSID), that were seen at the American University of Beirut Hospital is reviewed. The series includes nine cases with documented alpha-heavy chain disease (α-HCD). IPSID is characterized by the presence of a diffuse and compact bandlike lymphoplasmacytic infiltration of the proximal small intestinal mucosa. The presence of a concomitant malignant lymphoma in the intestine and/or mesenteric lymph nodes and of alpha-heavy protein in the serum is commonly encountered. Two histopathologic variants of IPSID are present. The first is characterized by the diffuse infiltration of the mucosa, at sites away from tumoral masses, by either pure plasmacytic infiltration or by mixed lymphoplasmacytic infiltration. This variety is associated with the immunoblastic sarcoma type of malignant lymphoma, and with α-HCD. The second variant is characterized by a diffuse follicular lymphoid hyperplasia pattern in the small intestin-

al mucosa. The associated malignant lymphoma is diffuse and undifferentiated often having a starry-sky pattern. This variety is not associated with α-HCD. Both histologic variants share the same clinical antecedents. In five patients, mesenteric lymph nodes harbored immunoblastic sarcoma while the intestinal mucosae of the same patients were involved with a benign-appearing lymphoplasmacytic infiltration. This finding stresses the need for staging laparotomy. Three patients, with α-HCD, had peripheral lymph node involvement with immunoblastic sarcoma. The disease apparently evolves in two stages: an immunoproliferative phase, probably reversible, and a later development of malignant lymphoma. The term IPSID accurately describes the nature of the entity.

6223 EOSINOPHILIC ILEITIS. (Fre.) Germain, M.; Lemaigre, G.; Lapierre, J.; Lenriot, J. (Centre Hospitalier de Longjumeau, 91160 Longjumeau, France). *J. Chir. (Paris)* 114(5):377-384; 1977.

Eosinophilic ileitis, found almost exclusively in the coastal areas of Japan, Brittany, and the Netherlands, has long been attributed to infestations with ascarids, *Anisakis* or *Eustoma rotundatum* larvae (the latter two parasitic larvae are acquired by eating raw fish). A case of possibly nonparasitic eosinophilic ileitis in a 17-yr-old boy is discussed. As in the majority of cases, symptoms mimicking appendicitis led to a surgical intervention that revealed two 10-cm segments of thickened, discolored ileum. A segmental resection was performed. The patient had a marked eosinophilia (11% of WBC). Antibody titers to *Toxocara canis* were borderline positive, but no parasites could be found in the stools or lesions. Recovery was uneventful. Histologically, the eosinophilic granulomas are easily identified by the characteristic eosinophilic infiltration. Clinical diagnosis is difficult, but the disease may be suspected in patients with a history of allergies, having appendicitis-like symptoms and eosinophilia greater than 10% of WBC. Medical treatment (piperazine, delta-cortisone) may be attempted in nonurgent cases. There is often a tendency towards spontaneous regression of the ileitis. In all cases the diagnosis can only be confirmed by histologic examination.

6224 ALTERATIONS IN INTESTINAL STRUCTURE, FAT ABSORPTION AND BODY WEIGHT AFTER INTESTINAL BYPASS FOR MORBID OBESITY. (Eng.) Friedman, H. I.; Chandler, J. G.; Peck, C. C.; Nemeth, T. J.; Odum, S. K. (Letterman Army Inst. Res., Presidio San Francisco, San Francisco, CA). *Surg. Gynecol. Obstet.* 146(5):757-767; 1978.

To document the morphologic alterations in the small intestine after intestinal bypass, 11 patients who underwent jejunoileal bypass for morbid obesity were studied. Serial intestinal biopsies were obtained prior to and at timed intervals following operation in both fasted and fat-fed states. Villus height increased asymptotically, reaching a plateau at 80% in excess of the preoperative value (0.42 ± 0.08 mm) after operation. Fat ingestion did not affect villus height. The postbypass body weight reached a plateau at 63.9 ± 11.1% of initial body weight over a 16-month period and correlated linearly ($r=-0.97$, $p<0.1$) with villus height following an asymptotic curvilinear course. The time required to attain 90% of total body weight loss was 15.9 months. A study of intestinal fat absorption at both the light microscopic and ultrastructural levels showed that the enlarged villi were lined along the entire villus by functionally mature epithelium capable of transporting lipid. The normal pattern of intracellular lipid accumulation remained constant preoperatively and postoperatively. Villus hypertrophy is an important mechanism in the plateauing of weight loss after jejunoileal bypass for morbid obesity.

6225 THE PREVENTION OF BYPASS ENTERITIS AFTER JEJUNOILEAL BYPASS FOR MORBID OBESITY. (Eng.) Hubbard, T. B., Jr. (Mercy Hosp., 301 St. Paul Pl., Baltimore, MD 21202). *Ann. Surg.* 187(5): 502-509; 1978.

A preliminary report of efforts to devise a valve to prevent reflux into the bypassed intestine after jejunoileal bypass is presented. Valve I (42 cases) was formed by dividing the ileum, everting the proximal end as one matures an ileostomy, and inserting this into the distal ileum. Only 12 of these valves were competent. Valve II (6 cases) was formed by dividing the ileum and merely inserting the proximal bowel into the distal, allowing it to evert spontaneously as with an unmatured ileostomy. In two cases, the valve was competent, but four cases became obstructed and this valve is mentioned only to be condemned. Valve III (19 cases) is similar to an isoperistaltic Kock valve, except that the intussuscepted ileum is first divested of its mesentery. All such valves have been competent. All 33 patients with a competent valve have been free of the stigmata of bypass enteritis, whereas 54% of 156 patients showed the symptoms of enteritis after conventional jejunoileal bypass.

6226 GROWTH, HEALTH, AND DEVELOPMENT AFTER NEONATAL GUT SURGERY: A LONG-TERM FOLLOW-UP. (Eng.) Tejani, A.; Dobias, B.; Nangia, B. S.; Mahadevan, R. (Methodist Hosp., 506 Sixth St., Brooklyn, NY 11215). *Pediatrics* 61(5):685-693; 1978.

Growth and development data on 19 children who survived gut surgery in the immediate newborn period were studied to evaluate the quality of life following neonatal gut surgery. The follow-up period ranged from 7 months to 7 yr, 6 months, with a mean of 3 yr, 8 months. Neonates who underwent gut resection were at a higher risk for delay in height and weight gain compared with those who had gut surgery without resection. Six of the 12 children who had gut resection showed delay in height gain, and 7 showed delay in weight gain. Of the seven children who had gut surgery but no resection, only one showed delay in height and weight gain after the age of 1 yr. An individual approach and careful serial follow-ups are recommended for all children

undergoing gut resection in the newborn period. Of the eight children who had psychometric testing in the gut-resected group, only two are normal. Three of the four older children in this group show signs of perceptuomotor defects, suggesting the need for subtesting such children at about 6 yr of age so that remedial help, if necessary, may be provided when formal schooling begins.

6227 ILEAL LOOP STENOSIS: A LATE COMPLICATION OF URINARY DIVERSION. (Eng.) Mitchell, M. E.; Yoder, I. C.; Pfister, R. C.; Daly, J.; Althausen, A. (Massachusetts General Hosp., Boston, MA 02114). *J. Urol.* 118(6):957-961; 1977.

6228 INFLAMMATORY CELL COUNT AND IDENTIFICATION IN SPECIFIC DUODENITIS (CELIAC DISEASE, WHIPPLE'S DISEASE AND CROHN'S DISEASE): COMPARISON WITH JEJUNAL FINDINGS. (Eng.) Cheli, R.; Giacosa, A. (Ospedali Civili di Genova, Genova, Italy). *Endoscopy* 9(3):147-151; 1977.

6229 HERNIA THROUGH THE FORAMEN OF WINSLOW. (Eng.) Ohkuma, R.; Miyazaki, K. (Shimonoseki Natl. Hosp., Shimonoseki, Japan). *Jpn. J. Surg.* 7(3):151-157; 1977.

6230 CURRENT STATUS OF INTESTINAL BYPASS SURGERY IN THE TREATMENT OF OBESITY. (Eng.) Bray, G. A. (Harbor General Hosp., 1000 W. Carson St., Torrance, CA 90509). *Diabetes* 26(11):1072-1079; 1977.

6231 MICROSCOPIC AND PULSE CYTOPHOTOMETRIC INVESTIGATION OF A CARCINOMA OF THE JEJUNUM IN A SEVEN YEAR OLD CHILD. (Eng.) Busing, C. M.; Haag, D.; Geiger, H.; Tschahargane, C. (Stadt. Krankenanstalten, Theodor-Kutzer-Ufer, D-6800 Mannheim, W. Germany). *Virchows Arch. [Pathol. Anat.]* 375(2):115-122; 1977.

6232 TREATMENT OF INTESTINAL FISTULAS. (Eng.) Monod-Broca, P. (Hopital de Bicetre, 94270 France). *Br. J. Surg.* 64(10):685-689; 1977.

6233 NUTRITIONAL SUPPORT OF FISTULAS. (Eng.) Holmes, J. H. (Peterborough District Hosp., Thorpe Rd., Peterborough, England). *Br. J. Surg.* 64(10):695-697; 1977.

6234 LOCAL AND SURGICAL MANAGEMENT OF ENTEROCUTANEOUS FISTULAS. (Eng.) Irving, M. (Hope Hosp., Salford, England). *Br. J. Surg.* 64 (10):690-694; 1977.

6235 DUODENAL DIVERTICULUM CAUSING INTERMITTENT-PERSISTENT CHOLESTASIS: ASSOCIATED WITH PAPILLITIS CHRONICA FIBROSA. (Eng.) Manabe, T.; Yu, G. S. M. (Albert Einstein Coll. Medicine, New York, NY). *N.Y. State J. Med.* 77(13):2132-2136; 1977.

6236 REFLUX THROUGH THE SPHINCTER OF ODDI? INFLUENCE OF DUODENAL DISTENTION UPON BILIARY TRACT AND PANCREAS: EXPERIMENTAL STUDY. (Eng.) Murat, J. E. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, June 8-9, 1976.* (Basel: S. Karger): 86-89; 1977.

6237 USE OF BARIUM DUODENOGRAPHY IN DIAGNOSIS OF TUMORS OF THE AMPULLA OF VATER. (Eng.) Lecomte, P.; Gavoille, H.; Breton, M.; Delmont, J. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, June 8-9, 1976.* (Basel: S. Karger): 102-110; 1977.

6238 THE SPHINCTER OF ODDI IN MUCOSAL DIVERTICULA OF THE DUODENAL WINDOW. (Eng.) Rives, J.; Lardennois, B.; Flament, J. B. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, June 8-9, 1976.* (Basel: S. Karger): 145-152; 1977.

6239 PARAAMPULLARY DUODENAL CYSTS: THEIR RELATIONS WITH CHRONIC PANCREATITIS. (Eng.) Martin, E. D. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, June 8-9, 1976.* (Basel: S. Karger): 156-162; 1977.

6240 GASTROINTESTINAL ADAPTATION FOLLOWING SMALL BOWEL BYPASS FOR OBESITY. (Eng.) Dudrick, S. J.; Daly, J. M.; Castro, G.; Akhtar, M. *In: Transactions of the Southern Surgical Association Eighty-Eighth Annual Meeting held at The Breakers, Palm Beach, Florida, December 6-8, 1976.* (Philadelphia: J. B. Lippincott Co.): 88: 150-156; 1977.

6241 IS DUODENITIS A DYSPEPTIC MYTH? (Eng.) Thomson, W. O.; Robertson, A. G.; Imrie, C. W.; Joffe, S. N.; Lee, F. D.; Blumgart, L. H. (Royal Infirmary, Glasgow, G4 OSF, Scotland). *Lancet* 1(8023):1197-1198; 1977.

6242 OBTURATOR HERNIA: AN ELUSIVE DIAGNOSIS. (Eng.) Kozlowski, J. M.; Beal, J. M. (Northwestern Univ. Medical Sch., 303 E. Chicago Ave., Chicago, IL 60611). *Arch. Surg.* 112(8):1001-1002; 1977.

6243 SMALL-INTESTINAL INVOLVEMENT IN FAMILIAL POLYPOSIS DIAGNOSED BY OPERATIVE INTESTINAL FIBERSCOPY: REPORT OF FOUR CASES. (Eng.) Ohsato, K.; Yao, T.; Watanabe, H.; Iida,

M.; Itoh, H. (Kyushu Univ. Faculty Medicine, Fukuoka 812, Japan). *Dis. Colon Rectum* 20(5):414-420; 1977.

6244 PROSTAGLANDINS AND ACUTE INTESTINAL PSEUDO-OBSTRUCTION [Letter to Editor]. (Eng.) Chousterman, M.; Petite, J. P.; Housset, E.; Hornych, A. (Boussais Hosp., 75674 Paris, Cedex 14, France). *Lancet* 2(8029):138-139; 1977.

6245 SMALL PARADUODENAL HERNIAS. (Eng.) Freund, H.; Berlatzky, Y. (Hadassah Univ. Hosp., Jerusalem, Israel). *Arch. Surg.* 112(10): 1180-1183; 1977.

6246 DIAGNOSIS AND TREATMENT OF DIFFUSE ILEOJEJUNITIS. (Eng.) Goldstein, F.; Abramson, J.; Messori, D. A.; Szydlowski, T.; Thornton, J. J., III (Lankenau Hosp., Philadelphia, PA 19151). *Am. J. Gastroenterol.* 68(5):465-469; 1977.

6247 SMALL BOWEL MELAENA: 2 CASES DIAGNOSED BY ANGIOGRAPHY. (Eng.) Forbes, W. St. C.; Nolan, D. J.; Fletcher, E. W. L.; Lee, E. (Dept. Diagnostic Radiology, Univ. Manchester, Stopford Building, Manchester M13 9PT, England). *Br. J. Surg.* 65(3):168-170; 1978.

See also, 6006, 6024, 6038, 6045, 6047, 6049, 6057, 6059, 6072, 6073, 6081, 6084, 6100, 6102, 6180, 6121, 6145, 6156, 6164, 6168, 6272, 6308, 6309, 6347, 6364, 6498, 6506, 6508, 6516, 6518, 6519, 6525, 6533, 6535, 6539, 6543, 6551, 6556, 6560, 6561.

SMALL INTESTINE

Malabsorption

6248 COELIAC DISEASE IN SCHOOLCHILDREN. (Eng.) Kalapesi, Z.; Rees, J. P. R. (Natl. Children's Hosp., Dublin, Ireland). *Ir. Med. J.* 71(6): 188-191; 1978.

The clinical picture and laboratory findings in 24 patients with celiac disease who were diagnosed after 4 yr of age are presented. The classical clinical picture was rare; growth retardation and anemia were the most common presenting features, short stature being present in 17, and low hemoglobin levels (<11 g/dl) in 20 patients. The anemia was mainly hypochromic with low serum iron (<60 µg/dl in 16/19 cases), but low serum folic acid (<2.7 ng/ml) was also a consistent finding (14/19). Abdominal pain was a feature in 42% of the cases. A history of bowel habit was very unreliable, and diarrhea was often episodic in nature. No single laboratory test seemed to be an effective screening test for malabsorption. This fact emphasizes the importance of intestinal biopsy, particularly with children presenting with retarded growth and anemia, with or without gastrointestinal symptoms.

6249 FURTHER EVIDENCE OF A PRIMARY MUCOSAL DEFECT IN COELIAC DISEASE. (Eng.) Cornell, H. J.; Rolles, D. J. (Royal Melbourne Inst. Technology, 124 LaTrobe St., Melbourne, Victoria, 3000, Australia). *Gut* 19(4):253-259; 1978.

The basic chemical structure of fraction 9 components of a peptic-tryptic-pancreatinic digest of wheat gliadin was analyzed for a better understanding of the toxicity of fraction 9 for celiac disease patients. Subfractions of fraction 9 were subjected to *in vitro* mucosal digestion and the filtrates were examined for residual peptides. Small intestinal mucosa from four groups of individuals were studied: eight patients with celiac disease in remission, eight healthy controls (2 adults and 6 children), nine first-degree relatives (2 adults and 7 children) of patients with celiac disease, and six children with recurrent diarrhea investigated for possible celiac disease, but in whom the diagnosis was excluded. The highest amounts of residual peptides (measured by scanning densitometer) were detected after digestion with mucosa from patients with celiac disease and the lowest amounts from the controls ($p<0.001$). The results obtained with the group of relatives fell between those of the celiac disease and control groups, while the recurrent diarrhea group overlapped the relatives and controls. The residual peptides were derived chiefly from the B-type subfractions (pH 6 eluates from SP Sephadex-C25 columns) of subfractions 1 and 2, obtained by ion-exchange chromatography of fraction 9. These subfractions are rich in glutamine/glutamic acid (45.0 and 35.7 molar% for 1B and 2B, resp.) and proline (24.0 and 19.4 molar% for 1B and 2B, resp.) and have a molecular weight (apparent) of not greater than 1,500 daltons. The results lend further support to the hypothesis of an enzyme deficiency in celiac disease. A partial enzyme deficiency may exist in some first-degree relatives and in some

children with recurrent diarrhea but with histology of the small intestine within normal limits. Human lymphocyte antigen (HLA)-B8 was found not to be correlated with this deficiency, but, when the two factors are associated, they could be related to the manifestation and severity of celiac disease.

6250 EFFECT OF HYPEROSMOLAR STIMULI AND COELIAC DISEASE ON THE PERMEABILITY OF THE HUMAN GASTROINTESTINAL TRACT. (Eng.) Wheeler, P. G.; Menzies, I. S.; Creamer, B. (King's Coll. Hosp. Medical Sch., London, England). *Clin. Sci. Mol. Med.* 54(5):495-501; 1978.

Oral loads with different marker substances were used to assess gastrointestinal permeability in 18 normal subjects and 5 patients with celiac disease. Lactulose (molecular weight [MW] 342), raffinose (MW 504), stachyose (MW 666), and a fluorescein-labeled dextran (MW 3,000) were used as marker substances. Timed urinary recovery of these substances, which are not metabolized, was measured by quantitative papaer chromatography and direct fluorimetry, and the results were used as an indication of passive intestinal permeability. The results in healthy adults showed that permeability to these markers was dependent on molecular size, even after correction for aqueous diffusion differences, such that a profile of restricted permeability could be described for this range of markers. Interpretation in terms of conventional pore theory suggested the presence of more than one population of pores. Ingestion of solutions made hyperosmotic by inclusion of glycerol resulted in a large increase in permeability, in a pattern that suggested an increase in either the size or frequency of a range of smaller pores. A similar increase in permeability and alteration in the profile of restriction was found in patients with celiac disease. The significance of intestinal permeability must relate to loss of metabolically important plasma constituents or absorption of antigenic, carcinogenic, or other toxic substances. A hyperosmotic stress or celiac disease, might enhance this possiblity, and increased accessibility to gliadin or its toxic fractions might, in the latter case, provide a self-perpetuating pathogenic stimulus.

6251 COWS' MILK PROTEIN-SENSITIVE ENTEROPATHY: AN IMPORTANT FACTOR IN PROLONGING DIARRHOEA OF ACUTE INFECTIVE ENTERITIS IN EARLY INFANCY. (Eng.) Iyngkaran, N.; Robinson, M. J.; Sumithran, E.; Lam, S. K.; Puthucheary, S. D.; Yadav, M. (Dept. Pediatrics, Univ. Malaya, Kuala Lumpur, Malaya). *Arch. Dis. Child.* 53(2):150-153; 1978.

The possible role of cows' milk protein in prolonging diarrhea in very young infants with acute infective enteritis was studied in 14 infants, 9 under the age of 2 months and 5 older than 6 months. Bacterial pathogens (*Salmonella* and enteropathogenic *Escherichia coli*) were isolated from the stools of four infants from the younger age group. After appro priate initial treatment, the infants were maintained on a cows' milk protein-free formula. Six weeks later jejunal biopsies were performed before and 24 hr after challenge with a low-lactose cows' milk protein formula. The immunoglobulin and complement levels in the serum and duodenal juice were also estimated at these times. Attempts to isolate bacterial and viral pathogens in stools were again made in all patients. The five older infants clinically tolerated cows' milk protein, and their pre- and postchallenge jejunal biopsies were within normal limits. However, moderate to severe histological changes were observed in the postchallenge jejunal biopsies of all 9 infants under 2 months of age; in addition, five of these infants developed diarrhea. These findings suggest that, in very young infants previously fed a cows' milk protein-based formula who contract infective enteritis, the jejunal mucosa suffers damage when rechallenged with cows' milk protein.

6252 RECURRENT COLONIC ULCERS IN CELIAC SPRUE, AN UNRECOGNIZED FATAL COMPLICATION: REPORT OF A CASE. (Eng.) Arvanitakis, C. (Kansas Univ. Medical Center, Rainbow Blvd. at 39th St., Kansas City, KS 66103). *Dis. Colon Rectum* 20(7):613-617; 1977.

6253 EFFECT OF COW'S MILK ON THE GASTROINTESTINAL TRACT: A PERSISTENT DILEMMA FOR THE PEDIATRICIAN. (Eng.) Eastham, E. J.; Walker, W. A. (Massachusetts General Hosp., Boston, MA 02114). *Pediatrics* 60(4):477-481; 1977.

6254 MALNUTRITION AND MALABSORPTION: EFFECT OF NUTRITIONAL REHABILITATION ON GASTROINTESTINAL FUNCTION IN KWASHIORKOR AND MARASMUS--A LONGITUDINAL STUDY. (Eng.) Pimparkar, B. D.; Donde, U. M.; Ambegaonkar, S. D.; Bharucha, P. E. (K.E.M. Hosp., Bombay, India). *Am. J. Gastroenterol.* 67(6):580-588; 1977.

6255 LACTOSE MALABSORPTION AMONG THE PIMA INDIANS OF ARIZONA. (Eng.) Johnson, J. D.; Simoons, F. J.; Hurwitz, R.; Grange, A.; Mitchell, C. H.; Sinatra, F. R. (Stanford Univ. Sch. Medicine, Stanford, CA 94305). *Gastroenterology* 73(6):1299-1304; 1977.

6256 REVERSIBLE MALABSORPTION CAUSED BY METHYLDOPA. (Eng.) Shneerson, J. M.; Gazzard, B. G. (Whipps Corss Hosp., Leytonstone, London E11 1NR, England). *Br. Med. J.* 2(6100):1456-1457; 1977.

See also, 6008, 6139, 6224, 6228, 6273, 6338, 6350, 6499, 6505, 6524, 6531, 6536, 6540, 6561.

6257 DETECTION AND TREATMENT OF RECURRENT CANCER OF THE COLON AND RECTUM. (Eng.) Welch, J. P.; Donaldson, G. A. (Hartford Hosp., 85 Jefferson St., Hartford, CT 06106). *Am. J. Surg.* 135(4):505-511; 1978.

A series of 177 patients with recurrent colorectal cancer treated at the Massachusetts General Hospital is examined retrospectively. Two-thirds of recurrences were observed by the second postoperative year, and 15% of patients were asymptomatic. Pelvic recurrences were usually attributable to rectal or sigmoid tumors, whereas right-sided carcinomas frequently spread to the liver. The most common methods of clinical discovery of recurrence included findings of abdominal and pelvic masses (17% and 11%, resp.), hepatomegaly (14%), and positive chest films (16%). The average survival after discovery of recurrence was only 11 months, but 23 patients having reresections for cure lived an average of 33 months. Seven patients undergoing reresection for cure represented probable cures. Chemotherapy with i.v. 5-fluorouracil (77 patients) provided poor palliation, but radiotherapy (54 patients) gave satisfactory relief of symptoms in many patients, particularly those with rectal or low colon lesions. A program of follow-up is suggested since there is evidence that even the symptomatic patient may be well-palliated or even cured by surgical resection of the recurrence or by palliative therapy.

6258 ADJUVANT RADIATION THERAPY IN COLORECTAL CARCINOMA. (Eng.) Friedmann, P.; Park, W. C.; Afonya, I. I.; Chabot, J. R.; Garb, J. L.; Pace, O. T.; *et al.* (Baystate Medical Center, 759 Chestnut St., Springfield, MA 01107). *Am. J. Surg.* 135(4):512-518; 1978.

A series of 65 patients with adenocarcinoma of the rectum and rectosigmoid is reviewed. Thirty-two patients had surgery alone (S group), 14 patients underwent postoperative radiation therapy (PO group), and 19 patients underwent preoperative radiation therapy (PRO group). A moderate-dose program of 4,000 to 4,500 r was used. The PO treatment group had a higher incidence of stage C lesions (12/14 versus 7/32 in the S group and 5/19 in the PRO group, $p<0.005$) and a higher recurrence rate (10/14 versus 4/32 in the S group and 5/19 in the PRO group), but there were no statistically significant differences in survival (40% in the PO group and 60% in the S group at 24 months and 70% in the PRO group at 30 months). Postoperative radiation therapy in patients with stage C lesions did not prolong life and is of little benefit. The PRO treatment group tolerated the radiation very well, and there were no major complications. Eight patients underwent anterior resections in irradiated fields. Two minor anastomotic leaks subsequently healed spontaneously. There were no pelvic recurrences in the PRO treatment group, and the incidence of lymph node metastases was 26% as opposed to 41% in the S group. It is concluded that preoperative moderate-dose radiation is not associated with increased risk of morbidity or mortality. It may be useful in reducing the incidence of lymph node metastases and pelvic recurrence. The effect on survival is not determined in this study.

6259 CLOSTRIDIUM DIFFICILE AND THE AETIOLOGY OF PSEUDOMEMBRANOUS COLITIS. (Eng.) Larson, H. E.; Price, A. B.; Honour, P.; Borriello, S. P. (Clinical Research Center, Watford Road, Harrow, Middlesex HA1 3UJ, England). *Lancet* 1(8073): 1063-1066; 1978.

To demonstrate that a toxin of clostridial origin causes pseudomembranous colitis (PMC), bacterial isolates from 5 patients with histologically proven PMC, 11 healthy adults, 20 patients with other bowel disorders, and 8 healthy newborn babies were screened for toxin production. Seven strains of *Clostridium* from four PMC patients produced *in vitro* a toxin similar to that found in their fecal suspensions. These strains were identified as *C. difficile*. *C. difficile* was not isolated from any of the 31 healthy adults or patients with other bowel disorders, although it was found in five of eight neonates, and toxin was present in the feces of two of them. Strains from two of the patients induced a fatal enterocolitis when inoculated p.o. into hamsters pretreated with vancomycin. The *C. difficile* that produced the toxin *in vitro* was then re-isolated from the hamster cecal contents. These findings suggest that PMC results from infection with *C. difficile* and that previous antibiotic therapy produces susceptibility to infection.

6260 VILLOUS TUMORS OF THE RECTUM AND COLON: A PATHOLOGICAL, CLINICAL AND THERAPEUTIC STUDY AND REPORT OF 81 CASES. (Fre.) Sarles, J.; N'Guyen, R.; Anfossi, G. (C.H.U., Hopital Nord, 13326 Marseille Cedex 3, France). *Ann. Chir.* 31(8): 699-705; 1977.

A series of 81 villous tumors occurring in 60 patients was analyzed pathologically, clinically, and therapeutically. Multiple tumors were present in 20% of patients. Degenerated tumors comprised 18.5% of the total (13 invasive cancers and 2 *in situ*). Tumors with a diameter less than 5 cm had degenerated in only 12.7% of cases, whereas those with a diameter over 5 cm were degenerated in 50% of cases; in addition, 67% of all degenerated tumors occurred in patients over 60 yr old. The chief symptoms included hemorrhage, abundant mucous discharge, and diarrhea. Pediculated tumors were removed with a diathermy loop through a sigmoidoscope with only 1/18 known recurrences. Sessile tumors within 10 cm of the anal margin were surgically removed by the perineal route, and recurrences were seen in 4/13 patients; in contrast, removal of high tumors by colotomy led to no recurrences. Segmental colectomies and abdominoperineal amputations were successful in six patients with invasive, large, or multiple sessile tumors. The authors suggest that posterior rectotomies should be used more frequently for large tumors within 10 cm of the anal margin to prevent recurrences. Malignant villous tumors treated by wide removal have an excellent prognosis.

6261 LYMPHOMA OF THE COLON: THE SPECTRUM OF RADIOLOGIC CHANGES. (Eng.) O'Connell, D. J.; Thompson, A. J. (Dept. Radiology [Box 429], Univ. Chicago, 950 East 59th St., Chicago, IL 60637). *Gastrointest. Radiol.* 2(4):377-385; 1978.

The radiographic findings of 34 patients with colonic lymphoma are reviewed. Thirteen patients had primary tumors (PT), while the remaining 21 had colonic involvement secondary to systemic disease (secondary tumors, ST). The radiologic features were mucosal nodularity (2/13 PT patients, 12/21 ST patients), endo-exoenteric mass (2/13 PT, 10/21 ST), intraluminal mass (7/13 PT, 1/21 ST), mural infiltration, and mesenteric invasion (1/13 PT and 1/21 ST in each of the latter 2 cases). One patient with diffuse mucosal nodularity developed acute colonic dilatation, while two other patients had pneumatosis coli secondary to local tumor depositions. Lymphoma is now a well-described complication of chronic ulcerative colitis, and a further case is described here. Although colonic lymphoma is a relatively rare tumor, the spectrum of radiologic changes reviewed here may enable a more accurate radiologic diagnosis.

6262 ENDOCRINE CELLS OF THE COLON IN HIRSCHSPRUNG'S AND CONTROL CHILDREN. (Eng.) Cristina, M. L.; Lehy, T.; Voillemot, N.; Arhan, P.; Pellerin, D.; Bonfils, S. (Hopital Bichat, F-75877 Paris Cedex 18, France). *Virchows Arch. [Pathol. Anat.]* 377(4):287-300; 1978.

To determine if any anomaly of the colonic cell population might accompany the interruption of the development of the myenteric plexus in congenital megacolon, the large intestine resected from six Hirschsprung's patients and surgical colonic biopsies from six control children were examined with light and electron microscopy. In light microscope studies, endocrine cell data were expressed as number of cells per unit area of mucosa using a quantitative method after argentaffin and Grimelius's argyrophilic techniques and an immunoperoxidase reaction with glucagon and somatostatin (SRIF) antisera. The number and frequency of endocrine cells did not differ significantly between the ganglionic and aganglionic segments of Hirschsprung's patients or between the latter and control children. Glucagon immunoreactive cells were, on the average, 5-6 times and 7-9 times more numerous than SRIF cells in the rectum and the sigmoid, resp. Ultrastructurally, five endocrine cell types were distinguished; four types are found in the normal human colon, while the fifth type, probably a transition type, apparently disappears in adults. This study has established the presence of endocrine cells along the entire distal colonic mucosa in Hirschsprung's disease.

6263 COLONIC MYOELECTRICAL ACTIVITY IN IRRITABLE-BOWEL SYNDROME. (Eng.) Sullivan, M. A.; Cohen, S.; Snape, W. J., Jr. (570 Maloney Building, Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *N. Engl. J. Med.* 298(16):878-883; 1978.

To determine the effect of a standard meal on colonic myoelectrical and motor activity in the irritable bowel syndrome and to determine the effect of a single dose of an oral anticholinergic drug (5 mg clidinium bromide) on this response, 10 patients with the irritable bowel syndrome and 21 normal controls were studied. The patients showed a prolonged increase in both colonic spike ($p<0.05$) and motor activity ($p<0.05$) after eating as compared with normal subjects. In the patients, the greatest increase in spike activity over fasting levels occurred 30-80 min or longer after eating ($p<0.005$). Clidinium did not affect the frequency of colonic slow waves (early response) or the basal colonic spike and motor activity in response to a meal. However, the anticholinergic drug reduced the prolonged postprandial colonic spike and motor response in the patients and also reduced the postprandial increase in colonic contractions at 3 cycles/min ($p<0.05$). These studies indicate that patients with the irritable bowel syndrome show an abnormally prolonged postprandial increase in colonic spike and motor activity. An anticholinergic drug reduces the duration and the magnitude of this abnormal colonic response.

6264 VALUE OF X-RAY, RECTOSCOPY, AND COLONOSCOPY IN THE DIAGNOSIS OF THE MAJOR DISEASES OF THE LARGE INTESTINE. (Ger.) Zastrow, R.; Moldenhauer, W. (Klinik fur Innere Medizin, Wilhelm-Pieck-Universitat, Ernst-Heydemann-Strasse 6, DDR-25 Rostock, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(4):167-173; 1977.

6265 RADIOLOGICAL PICTURE OF NON-NEOPLASTIC CONDITIONS OF THE LARGE INTESTINE OBTAINED BY DOUBLE-CONTRAST ENEMA. (Ita.) Bartalena, D.; Bassi, F.; Bartalena, G.; Pezzi, A.; Ricci Maccarini, P.; Brusori, G.; *et al.* (No affiliation given). *Bull. Soc. Med.* 149(2):144-161; 1977.

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6268 STATE OF THE ART OF EMERGENCY SURGERY OF THE COLON AND ANALYSIS OF A PERSONAL EXPERIENCE (PART 2). (Spa.) Suarez Garcia-Sampedro, F.; Arano Bermejo, J. I.; Soleto Saez, E.; Dominguez Sayans, J.; Miguel Velasco, J. E.; Parada Herrero, R.; *et al.* (Ciudad Sanitaria de la Seguridad Social "La Paz," Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 51(6):715-734; 1977.

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6273 ARTHROPATHIES IN ENTERAL DISEASES. (Ger.) Tanner, E.; Bosseckert, H.; Seidel, K. (Spezialklinik fur Rheumakranke, DDR-6821 Etzelbach, E. Germany). *Z. Gesamte Inn. Med.* 32(7):160-163; 1977.

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6278 HYPERDIAGNOSIS IN SIMPLE FORMS OF APPENDICITIS IN CHILDREN. (Rus.) Stepanov, E. A.; Dronov, A. F.; Gorbatova, N. E. (Dept. Pediatric Surgery and Orthopedics, N. I. Pirogov Moscow State Medical Inst., Moscow, USSR). *Klin. Khir.* (6):13-16; 1977.

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6299 MUCOUS COLITIS. (Ger.) Linhart, P. (Deutsche Klinik fur Diagnostik, Aukammallee 33, 6200 Wiesbaden, W. Germany). *Therapiewoche* 27(37):6396-6403, *passim;* 1977.

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6303 THE SIGNIFICANCE OF HIGH-FIBER DIET IN THE TREATMENT OF DIVERTICULOSIS, OBSTIPATION, AND MUCOUS COLITIS. (Ger.) Gnauck, R. (Deutsche Klinik fur Diagnostik, Aukammallee 33, 6200 Wiesbaden, W. Germany). *Therapiewoche* 27(37): 6411-6412; 1977.

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6305 SURGICAL MANAGEMENT OF DIVERTICULITIS OF THE COLON. (Ger.) Kummerle, F.; Bruckner, R. (Chirurgische Universitatsklinik Mainz, Langenbeckstrasse 1, D-6500 Mainz, W. Germany). *Schweiz. Med. Wochenschr.* 107(15):498-505; 1977.

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BEGIN, 69, avenue de Paris, 94610 Saint Mande, France). *Rev. Fr. Gastroenterol.* (134):9-13; 1977.

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6309 INTESTINAL DYSFUNCTION. A REVIEW OF LITERATURE. (Fre.) Poynard, T.; Chaput, J. C.; Labayle, D. (Hopital Antoine-Beclere, 157, rue de la Porte-de-Trivaux, F 92141 Clamart, France). *Gastroenterol. Clin. Biol.* 1(8/9):681-704; 1977.

6310 SENILE ECTASIA OF THE COLON. (Ger.) Simonyi, I. (Budapest Krankenhauses "Margit," 1300 Budapest III Pf. 41, Hungary). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 127(4): 387-388; 1977.

6311 ANAL FISTULAS. (Fre.) Bernard, D. (Hopital Saint-Luc, Montreal, Quebec, Canada). *Can. J. Surg.* 20(5):421-426; 1977.

See also, 6018, 6070, 6072, 6074, 6081, 6100, 6221, 6226, 6229, 6234, 6243, 6252, 6318, 6321, 6339, 6340, 6392, 6498, 6506, 6508, 6519, 6525, 6538, 6540, 6547, 6551, 6555, 6556.

LARGE INTESTINE

Ulcerative Colitis

6312 RADIOGRAPHIC CHARACTERISTICS OF COLONIC "MUCOSAL BRIDGES": SEQUELAE OF INFLAMMATORY BOWEL DISEASE. (Eng.) Hammerman, A. M.; Shatz, B. A.; Susman, N. (Jewish Hosp. St. Louis, 216 S. Kingshighway, St. Louis, MO 63108). *Radiology* 127(3):611-614; 1978.

The occurrence of colonic "mucosal bridges" as sequelae to inflammatory bowel disease, previously described pathologically and endoscopically, are described radiographically using two case reports (a 35-yr-old man and a 33-yr-old woman). The radiographic pattern is that of multiple, long, linear, branching band-like filling defects. In the first case, they demonstrated a constant appearance at annual examinations over a 10-yr period, indicating the durable nature of these structures. The bridges were mucosal-covered bands up to 15 cm in length (average lenth, 4-6 cm) crossing the lumen. They ranged from 0.4-0.6 cm in diameter. The basic disease process in this case was difficult to classify precisely (i.e., regional enteritis versus ulcerative colitis). In the second case, a patient with ulcerative colitis, the radiographic pattern suggested mucosal bridges, and at colonoscopy, long inflammatory polyps, thickened mucosal folds, and mucosal bridges were seen. Any disease of the colon with the propensity to develop deep ulcerations may possibly form mucosal bridges.

6313 SERUM LYSOZYME, SERUM PROTEINS, AND IMMUNOGLOBULIN DETERMINATIONS IN NONSPECIFIC INFLAMMATORY BOWEL DISEASE. (Eng.) El-Khatib, O. S.; Lebwohl, O.; Attia, A. A.; Flood, C. A.; Stein, J. A.; Sweeting, J. G.; *et al.* (Coll. Physicians & Surgeons, Columbia Univ., New York, NY). *Am. J. Dig. Dis.* 23(4):297-301; 1978.

The usefulness of serum lysozyme determinations in the differential diagnosis of nonspecific inflammatory bowel disease (IBD) into ulcerative colitis (UC), Crohn's disease (CD), or ulcerative proctitis (UP) was analyzed in 101 IBD patients. In addition, the disease activity was assessed independently of the laboratory findings by prospective determination of the serum lysozyme and immunoglobulin levels and by serum electrophoresis. Patients' disease states were categorized as active or inactive by clinical signs and symptoms observed when the serum samples were drawn. Although the mean serum lysozyme concentration of patients with CD (10.5 ± 6.8 μg/ml) and UC (9.6 ± 4.1 μg/ml), determined by a standardized lysoplate method, was significantly greater than that of normal controls (6.0 ± 1.5 μg/ml, $p<0.05$), the results did not correlate with the diagnosis or with the degree of disease activity. Individually separated protein fractions and serum immunoglobulins also did not correlate with the serum lysozyme levels. This study indicates that measurement of the level of serum lysozyme in individual patients is not helpful in determining the cause or degree of activity of nonspecific IBD.

6314 ABSENCE OF K CELLS IN HUMAN GUT MUCOSA. (Eng.) Clancy, R.; Pucci, A. (Faculty Medicine, Univ. Newcastle, NSW, Australia). *Gut* 19(4):273-276; 1978.

To determine whether antibody-dependent cell-mediated cytotoxicity (ADCC) operates as a cause of

tissue cell damage in inflammatory disease of the small and large bowel, cell suspensions of mucosal lymphocytes prepared from human gut resections or biopsies were assayed by two methods for ADCC. In the first method, the Chang hepatoma cell assay was used with rabbit anti-Chang cell antibody; in the second method, the Chang cells were coated with *Escherichia coli* lipopolysaccharide, and pooled sera from six normal sybjects shown to have agglutinating activity against the *E. coli* lipopolysaccharide were used. In both cases, ADCC was measured as the specific release of ^{51}Cr from the prelabeled target cells. Gut mucosal lymphocytes from normal subjects and subjects with ulcerative colitis, Crohn's disease, and colon carcinoma were examined by at least one of the methods; blood lymphocytes from each subject were used as controls. Whereas ADCC activity was regularly demonstrated in the blood lymphocytes of all subjects by both assays (specific cytotoxicity, 1-67%), ADCC activity was not detected with mucosal lymphocytes with either assay (0-1% specific cytotoxicity). The possibility that K-cell activity was masked by adsorbed blocking factors was examined by preincubating gut lymphocytes and by treating them with trypsin; blood lymphocytes were again used as controls. Neither treatment allowed the detection of meaningful K-cell activity in gut lymphocytes (0-3% specific cytotoxicity, compared with 0-12% with blood lymphocytes, 0% being recorded only after a 24-hr incubation and probably reflecting a short lifespan in cultures for K cells). It appears that cells capable of mediating ADCC cannot be isolated from either normal or inflamed human colon mucosa. This technique will facilitate the direct study of the cellular basis of mucosal defense mechanisms and the pathogenesis of mucosal disease in man.

6315 SIGNIFICANCE OF ANERGY TO DINITROCHLOROBENZENE (DNCB) IN INFLAMMATORY BOWEL DISEASE: FAMILY AND POSTOPERATIVE STUDIES. (Eng.) Meyers, S.; Sachar, D. B.; Taub, R. N.; Janowitz, H. D. (Annenberg 23-02, Mount Sinai Sch. Medicine, New York, NY 10029). *Gut* 19(4):249-252; 1978.

To evaluate the pathogenetic significance of impaired cellular immunity in inflammatory bowel disease (IBD), the cutaneous responsiveness to dinitrochlorobenzene (DNCB) was measured in 58 patients with IBD (33 with Crohn's disease and 25 with ulcerative colitis), 63 of their clinically normal relatives, 24 additional ileitis and colitis patients who had undergone resection of all visibly diseased bowel, and 23 control subjects. Cutaneous anergy to DNCB was demonstrated among 70% of the patients with Crohn's disease and 48% of those with ulcerative colitis, compared with only 9% of controls ($p<0.001$). There was no increased incidence of anergy among either 44 first-degree relatives (7%) or 19 spouses (0%), nor was there any special proclivity toward anergy among six pairs of patients with familial inflammatory bowel disease. In Crohn's disease, anergy was still present after bowel resection in 6 of 10 patients, while in ulcerative colitis anergy was found after colectomy in only 2 of 14 patients. The data suggest that the immune defect in patients with IBD may be a secondary phenomenon. In ulcerative colitis, the defect appears to reverse after colectomy, but in Crohn's disease it persists despite resection. This finding is consistent with the observed tendency of Crohn's disease, but not ulcerative colitis, to inexorable postoperative recurrence.

6316 II. PREVALENCE OF PERIPHERAL ARTHRITIS, SACROILIITIS, AND ANKYLOSING SPONDYLITIS IN PATIENTS SUFFERING FROM INFLAMMATORY BOWEL DISEASE. (Eng.) Dekker-Saeys, B. J.; Meuwissen, S. G. M.; van den Berg-Loonen, E. M.; de Haas, W. H. D.; Agenant, D.; Tytgat, G. N. J. (Amsterdam Center for Rheumatic Diseases, Amsterdam, Netherlands). *Ann. Rheum. Dis.* 37(1):33-35; 1978.

To establish the prevalence of peripheral arthritis (PA), radiographic sacroiliitis (RSI), and ankylosing spondylitis (AS) in patients with inflammatory bowel disease, 58 consecutive patients with ulcerative colitis (UC) and 51 with Crohn's disease (CD) underwent a detailed rheumatological examination. In addition, all patients were screened for the presence of the antigen human lymphocyte antigen (HLA) B27. PA was found in 8 UC and 6 CD patients. RSI was diagnosed in 5 UC and 6 CD patients, of whom 10 were asymptomatic, and AS was diagnosed in 2 UC and 2 CD patients. HLA B27 was found in 18.9% of the UC and 3.9% of the CD patients. One of the 11 patients with RSI and 2 of the 4 with AS had the HLA B27 antigen. PA, RSI, and AS are apparently frequent manifestations in patients with inflammatory bowel disease. Asymptomatic RSI in these patients appears to differ from idiopathic AS, both clinically and genetically. Evaluation of subjective rheumatological complaints, necessary for a confident diagnosis of AS, according to the New York criteria, is difficult during a flare-up of the inflammatory bowel process, as was shown in four CD cases with marked limitation of lumbovertebral function and chest expansion, but no radiological abnormalities of the sacroiliac joints.

6317 III. CLINICAL CHARACTERISTICS AND RESULTS OF HISTOCOMPATIBILITY TYPING (HLA B27) IN 50 PATIENTS WITH BOTH ANKYLOSING SPONDYLITIS AND INFLAMMATORY BOWEL DISEASE. (Eng.) Dekker-Saeys, B. J.; Meuwissen, S. G. M.; van den Berg-Loonen, E. M.; de Haas, W. H. D.; Meijers, K. A. F.; Tytgat, G. N. J. (Amsterdam Center for Rheumatic Diseases, Amsterdam, Netherlands). *Ann. Rheum. Dis.* 37(1):36-41; 1978.

To determine the genetic and clinical characteristics of patients with both inflammatory bowel disease (IBD) and ankylosing spondylitis (AS), a study was made, in cooperation with several gastroenterology and rheumatology centers, of 50 patients with either Crohn's disease (CD, 38 patients) or ulcerated colitis (UC, 12 patients), all 50 of whom also had AS (the latter diagnosis being established according to the New York criteria). Human lymphocyte antigen (HLA) B27 was positive in 20 CD and 8 UC patients. These frequencies were statistically significant ($p<0.001$ or $p<0.01$) when compared to

controls examined in a separately published series. The presence of HLA B27 was studied in relation to clinical parameters, such as first occurrence of symptoms of AS or IBD, a history of peripheral arthritis, iridocyclitis, and a positive history of AS or IBD. The patients were found to have heterogeneous clinical features: at one end of the spectrum, a group of cases was distinguished with the typical characteristics of idiopathic AS, often being HLA B27 positive. At the other end, a smaller group of HLA B27-negative patients was observed, with severe intestinal inflammatory pathology, lacking most of the typical clinical features of idiopathic AS ("secondary" form of AS). Finally, between these two extremes, a group of patients was found with less pronounced clinical or genetic characteristics. These different clinical and histocompatibility patterns suggest a mixed etiopathogenesis of AS in IBD patients. Such a "syndrome" of AS might harbor both idiopathic AS and forms of AS "secondary" to the intestinal inflammatory pathology.

6318 CHRONIC ULCERATIVE COLITIS AND COLON CANCER: CAN RADIOGRAPHIC APPEARANCE PREDICT SURVIVAL PATTERNS? (Eng.) James, E. M.; Carlson, H. C. (Mayo Clinic, Rochester, MN 55901). *Am. J. Roentgenol.* 130(5):825-830; 1978.

Twenty-four patients with chronic ulcerative colitis and colon carcinoma who underwent barium enema examination prior to the diagnosis of cancer were studied to correlate the radiographic appearance of the tumors with their biologic behavior, as well as to assess the accuracy of the barium enema in tumor detection. Of the radiographically detected tumors, 65% displayed an annular infiltrative appearance, with the prime radiographic manifestation being relative nondistensibility of the involved segment. The remaining tumors had various appearances (nodular or polyploid; annular, bulky; or villous) more typical of noncolitic colon cancer. Patients with infiltrative lesions had a much poorer prognosis than those with noninfiltrative lesions. Of 33 gross tumors described pathologically and/or surgically, only 70% were correctly detected by barium enema. It is suggested that periodic barium enema examinations are an unreliable means of following patients with ulcerative colitis if malignant degeneration is to be detected at an early and curative stage. Prophylactic proctocolectomy may be the best therapeutic approach.

6319 DEFICIENCY OF FREE SECRETORY COMPONENT (fSC) OF SALIVARY IgA IN INFLAMMATORY BOWEL DISEASE (IBD)--A FAMILY STUDY [Abstract]. (Eng.) Engstrom, J. F.; Sagawa, A.; Arvanitakis, C.; Abdou, N. I. (Kansas Univ. Sch. Medicine, Kansas City, KS). *Gastroenterology* 72(5, Part 2):1158; 1977.

6320 VIRAL INVESTIGATIONS IN INFLAMMATORY BOWEL DISEASE [Abstract]. (Eng.) Gitnick, G. L.; Rosen, V. J. (Univ. California, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1062; 1977.

6321 INCIDENCE OF FIRST HOSPITALIZATIONS FOR ULCERATIVE COLITIS, ULCERATIVE PROCTITIS, AND CROHN'S DISEASE IN BALTIMORE: A TEN-YEAR COMPARISON [Abstract]. (Eng.) Mendeloff, A. I.; Garagliano, C. F.; Lilienfeld, A. M. (No affiliation given). *Gastroenterology* 72(5, Part 2):1163; 1977.

6322 MORTALITY FROM ULCERATIVE COLITIS IN DENMARK 1960-1969. (Eng.) Kristensen, E.; Mosbech, J. (Copenhagen County Hosp., St. Elisabeth, 2300 Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(2):189-191; 1977.

6323 EVALUATION OF CANCER RISK IN CHRONIC ULCERATIVE COLITIS: PROGRESS REPORT OF A PROSPECTIVE STUDY [Abstract]. (Eng.) Levin, B.; Riddell, R. H. (Univ. Chicago Hosp., Chicago, IL). *Gastroenterology* 72(5, Part 2):1088; 1977.

See also, 6044, 6081, 6088, 6265, 6273, 6297, 6303, 6364, 6499, 6524, 6540.

PANCREAS

6324 THE PANCREAS: A CORRELATION OF FUNCTION AND STRUCTURE. (Eng.) Waye, J. D.; Adler, M.; Dreiling, D. A. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY). *Am. J. Gastroenterol.* 69(2):176-181; 1978.

To compare the diagnostic value of endoscopic pancreatography with secretin tests obtained from the same patients, 52 patients with or without pancreatic disease were studied with both the secretin test and endoscopic retrograde pancreatography (ERCP). Pancreatic histopathology was obtained by exploratory laparotomy in half of these patients to permit correlation of histology with ERCP and the secretin test. Of 21 patients with normal secretin tests, 14 had no clinical evidence of pancreatic disease and a normal ERCP, 3 had normal ERCP consistent with acute pancreatitis (2) and recurrent acute pancreatitis (1), and 4 had beading of the pancreatic duct on ERCP and histologically proven chronic pancreatitis. Of 21 patients with secretin tests suggesting chronic pancreatitis, 17

such diagnoses were histologically proven (12/17 also had abnormal ERCP); the remaining 4 had normal ERCP and histological evidence was lacking. Of four patients with secretin tests showing hypersecretion and who had normal ERCP, diagnoses of chronic hepatitis (1), primary biliary cirrhosis (1), and chronic pancreatitis (1) were histologically proven, and the unconfirmed diagnosis of early alcoholic pancreatitis (1) was made. In six patients with secretin tests showing low volume, three had abnormal ERCP (2 had carcinoma, 1 had had partial pancreatic resection); of the three with normal ERCP, one had chronic pancreatitis with fibrosis, and two had normal pancreas at laparotomy. It is concluded that (1) secretory tests are the most sensitive indicators of chronic pancreatitis, although not all cases of chronic pancreatitis will be discovered by this test, (2) when secretory tests show low volume output, pancreatography is crucial in differentiating between malignant ductal obstruction or pancreatic replacement by fibrosis or atrophy, (3) histologic correlation with ductular structure and/or secretin function is frequently discordant, and (4) the secretin test and pancreatogram measure different parameters, and the use of both these complementary studies will lead to increased diagnostic accuracy and better understanding of pancreatic pathophysiology.

6325 CLINICAL AND STATISTICAL STUDIES ON CONGENITAL DILATATION OF THE BILIARY TRACT IN RELATION TO ANOMALOUS ARRANGEMENT OF THE PANCREATICOBILIARY DUCTS. (Eng.) Udaka, H. (Sch. Medicine, Tokushima Univ., Tokushima, Japan). *Tokushima J. Exp. Med.* 24(3/4):165-173; 1977.

Among 16 cases of congenital dilatation of the biliary tract seen over a 4-yr period, 6 were found to be complicated by anomalous arrangement of the pancreaticobiliary ducts, prompting a nationwide search for similar cases in Japan. Among 852 cases of congenital dilatation of the biliary tract collected from major medical institutions, 570 cases supplied satisfactory information for detailed analysis. The male:female ratio was 3:7. The incidence was high in childhood (245/570 with 63/245 at less than 1 yr of age and 172/245 at less than 5 yr of age). Anomalous arrangement of the pancreaticobiliary ducts was found in 183/570 cases. A new morphological classification of dilatation of the biliary tract is proposed (cystic, spindle, cylindrical, rosary, and diverticular dilatation), and an anatomical classification of anomalous arragements of the pancreaticobiliary ducts is offered: (1) the common bile duct flows into the pancreatic duct (118/183 cases), (2) the pancreatic duct flows into the common bile duct (38/183 cases), and (3) the common bile duct flows into the main pancreatic duct and an accessory pancreatic duct is present (12/183 cases). There were 15/183 cases in which the anomaly was too complex to be classified in this system. From the present clinical and statistical investigations, anomalous arrangement of the pancreaticobiliary ducts can be postulated as one of the etiological factors of the congenital dilatation of the biliary tract.

6326 MACROAMYLASEMIA AND OTHER CHRONIC NONSPECIFIC HYPERAMYLASEMIAS: CHEMICAL ODDITIES OR CLINICAL ENTITIES. (Eng.) Warshaw, A. L.; Lee, K. H. (Massachusetts General Hosp., Boston, MA 02114). *Am. J. Surg.* 135(4):488-493; 1978.

Because macroamylasemia has been regarded as an associated phenomenon in other primary diseases and only a coincidental biochemical oddity, its significance as a clinical entity (as a determinant of erroneous diagnosis and overtreatment) and perhaps as a genuinely symptomatic pathophysiologic process was evaluated, and a new form of chronic hyperamylasemia is described. Seventeen patients with chronic hyperamylasemia (of whom 3 had alcoholic liver cirrhosis; 2, duodenal ulcer; 2, gallstones; and 1, leukemia) were studied using standard clinical and laboratory parameters, amylase/creatinine clearance ratios, and polyacrylamide gel electrophoresis of serum amylases. These patients, none of whom had evidence of pancreatic disease or other specific source for the elevated serum amylase, fell into three groups: (1) normal serum isoamylase profile and normal amylase clearance (6 patients), (2) macroamylasemia and very low amylase clearance rates (9 patients), and (3) salivary-type hyperamylasemia and low amylase clearance rates (2 patients). It is postulated that the generalized hyperamylasemia in group (1) may be due to reduced extrarenal catabolism of amylase, a previously undescribed phenomenon. Seven of the nine patients in group (2) had recurrent epigastric pain. Evidence for an autoimmune basis of this entity is discussed. The entity in group (3) may really be macroamylasemia in which the macroamylase complex dissociated during analysis. Chronic hyperamylasemia is often not of pancreatic origin. The assumption that the pancreas is at fault, especially if there is abdominal pain, may cause morbidity due to gross overtreatment.

6327 ANGIOGRAPHY OF PANCREATIC ARTERIOVENOUS MALFORMATION. (Eng.) Chuang, V. P.; Pulmano, C. M.; Walter, J. F.; Cho, K. J. (Univ. Kentucky Medical Center, Lexington, KY 40506). *Am. J. Roentgenol.* 129(6):1015-1018; 1977.

6328 THE DIAGNOSTIC EVALUATION OF ERCP IN PANCREATIC AND BILIARY CARCINOMA. (Eng.) Ogoshi, K.; Niwa, M. (Niigata Hosp., Kawagishicho 2, Niigata, 951 Japan). *Gastroenterol. Jpn.* 12(3): 218-223; 1977.

6329 PROLONGED OBSTRUCTIVE JAUNDICE AND GIANT CELL HEPATITIS IN AN INFANT WITH CYSTIC FIBROSIS [Letter to Editor]. (Eng.) Rosenstein, B. J.; Oppenheimer, E. H. (Johns Hopkins Hosp., Park 2, 601 N. Broadway, Baltimore, MD 21205). *J. Pediatr.* 91(6):1022-1023; 1977.

6330 PANCREAS ABSCESS: A FATAL COMPLICATION OF ENDOSCOPIC CHOLANGIOPANCREATOGRAPHY

(ERCP). (Eng.) Tseng, A.; Sales, D. J.; Simonowitz, D. A.; Enker, W. E. (Univ. Chicago Pritzker Sch. Medicine, 950 East Fifty-Ninth Street, Chicago, IL 60637). *Endoscopy* 9(4):250-253; 1977.

6331 PANCREATIC PSEUDOCYST WITH MASSIVE ASCITES. (Eng.) Hardy, T. J.; Madge, G. E. (Medical Coll. Virginia, Virginia Commonwealth Univ., Richmond, VA 23298). *South. Med. J.* 70(12):1472-1473; 1977.

6332 MUCINOUS BILIARY OBSTRUCTION ASSOCIATED WITH A CYSTIC ADENOCARCINOMA OF THE PANCREAS. (Eng.) Ito, Y.; Blackstone, M. O.; Frank, P. H.; Skinner, D. B. (Univ. Chicago Pritzker Sch. Medicine, Box 400, 950 East 59th St., Chicago, IL 60637). *Gastroenterology* 73(6):1410-1412; 1977.

See also, 6038, 6047, 6061, 6063, 6067, 6092, 6234, 6236, 6333, 6338, 6349, 6410, 6499, 6508, 6524, 6540.

PANCREAS

Pancreatitis

6333 GUIDELINES IN THE MANAGEMENT OF PATIENTS WITH PANCREATIC ABSCESS. (Eng.) Paloyan, D.; Simonowitz, D.; Bates, R. J. (Dept. Surgery, Univ. Chicago, Chicago, IL). *Am. J. Gastroenterol.* 69(1):97-100; 1978.

A systematic approach to the management of patients with pancreatic abscess is presented. The method includes an aggressive diagnostic approach relying on radiographic and ultrasound examinations and adequate transperitoneal drainage of the abscess, coupled with gastrostomy and feeding jejunostomy. The importance of nutritional support using an elemental diet administered through a jejunostomy is emphasized.

6334 GLUCAGON VS ANTICHOLINERGICS IN THE TREATMENT OF ACUTE PANCREATITIS: A DOUBLE-BLIND CONTROLLED TRIAL. (Eng.) Gilsanz, V.; Oteyza, C. P.; Rebollar, J. L. (Medical Sch., Universidad Complutense de Madrid, Madrid, Spain). *Arch. Intern. Med.* 138(4):535-538; 1978.

To test the therapeutic effect of glucagon on acute pancreatitis and to compare the results with those of a control group treated with an anticholinergic, 62 patients with acute pancreatitis, evaluated for severity according to uniform standards, were treated identically except that patients in one group received glucagon hydrochloride (group A) and those in the other, oxyphenonium bromomethylate (group B) in doses of 1 mg i.v. every 4 hr for 4 days. Each of the two homologous series comprised 31 patients, and mortality was the same for both groups (3/31). Statistical comparison of both series showed no significant differences in frequency of expected complications or in fall of serum amylase levels. During treatment, serum calcium levels were significantly reduced in group A ($p<0.005$), and the duration of the abdominal pain was shortened ($p<0.05$). The volume of gastric aspirate was smaller in group B ($p<0.005$), and vesical catheterization proved necessary more frequently ($p<0.005$). Thus, similar results are obtained when glucagon or anticholinergics are employed in the treatment of acute pancreatitis, although secondary effects differ.

6335 THE ROLE OF PERITONEAL LAVAGE IN SEVERE ACUTE PANCREATITIS. (Eng.) Ranson, J. H. C.; Spencer, F. C. (New York Univ. Medical Center, 560 First Ave., New York, NY 10016). *Ann. Surg.* 187(5):565-575; 1978.

Clinical experience with the management of acute pancreatitis and an evaluation of the therapeutic efficacy of peritoneal lavage are presented in 103 patients with "severe" pancreatitis (28% mortality) who were separated from 347 with "mild" pancreatitis (0.9% mortality) by previously described early objective signs. Early treatment (day 0-7) of severe pancreatitis included peritoneal lavage through catheters placed nonoperatively in 18 patients (group A) and by catheters placed at laparotomy in 6 (group C). Early treatment of nonlavage patients with severe pancreatitis was by standard nonoperative measures in 61 cases (group B) and included early operation in 18 (group D). Lavage was continued for 48-96 hr, usually using 36-48 liters/24 hr of balanced isotonic dialysate fluid, and was uncomplicated. Lavage led to striking immediate clinical improvement and no lavaged patient (groups A and C) died during the first 10 days of treatment for pancreatitis. By contrast, 45% of deaths in nonlavaged patients (groups B and D) occurred during this early period,

usually from cardiovascular or respiratory failure. Although lavage reduced mortality in subgroups of patients, ultimate overall survival was not affected (Group A, 83%; B, 84%; C, 33%; D, 33%). Late peripancreatic abscesses caused most deaths in lavaged patients. These data show that peritoneal lavage is a highly effective adjunct to the treatment for early complications of severe acute pancreatitis and dramatically reduces early mortality. Lavage does not prevent the late local sequelae of peripancreatic necrosis.

6336 PANCREATITIS IN CHILDHOOD. (Eng.) Buntain, W. L.; Wood, J. B.; Woolley, M. M. (Children's Hosp., 1601 Sixth Ave. South, Birmingham, AL 35233). *J. Pediatr. Surg.* 13(2):143-149; 1978.

All 30 cases of pancreatitis in children diagnosed at one institution during the period 1957-1972 are reviewed. Diagnosis was based on the clinical findings of pancreatic inflammation, laboratory confirmation with elevated serum and/or urinary amylase values, and in some cases surgical or postmortem evidence of peripancreatic fat necrosis and/or intramedullary fat necrosis with or without hemorrhagic manifestations. Four major classes of pancreatitis were seen and defined in children: traumatic (10 cases), systemic disease associated (7), drug-induced, caused by drug therapy for various life-threatening diseases (7), and chronic pancreatitis, with or without an anatomic abnormality (3). In addition, there were two cases of idiopathic acute pancreatitis and one of idiopathic acute relapsing pancreatitis. The overall mortality was 8/30, which compares unfavorably with the 12% mortality usually seen in adults with pancreatitis. If cases of traumatic pancreatitis are excluded, girls outnumber boys 5 to 1; patients ranged in age from 2 to 18 yr. A high index of suspicion is necessary to make the diagnosis, and this is very important if the mortality for pancreatitis in children is to be lowered. Awareness and consistent early aggressive intervention should increase the salvage rate. Pancreatitis is not as rare in the pediatric age group as has been commonly believed.

6337 THE FIRST 24 HOURS OF ACUTE PANCREATITIS: CHANGES IN BIOCHEMICAL AND ENDOCRINE HOMEOSTASIS IN PATIENTS WITH PANCREATITIS COMPARED WITH THOSE IN CONTROL SUBJECTS UNDERGOING STRESS FOR REASONS OTHER THAN PANCREATITIS. (Eng.) Drew, S. I.; Joffe, B.; Vinik, A., Seftel, H.; Singer, F. (Dept. Surgery, Univ. California, Los Angeles, CA 90024). *Am. J. Med.* 64(5):795-803; 1978.

Because the changes in biochemical and endocrine homeostasis in acute pancreatitis reflect both stress and the disease itself and because it is difficult to quantitate the magnitude of the stress response, two patient groups were compared. As a group, 20 patients with acute pancreatitis showed alterations in biochemical and endocrine homeostasis that differed from the metabolic reactions observed in 13 control patients undergoing stress for reasons other than pancreatitis. In patients with acute pancreatitis, hyperglycemia was associated with inappropriately low serum insulin levels ($p<0.005$). Plasma glucagon concentrations were markedly increased in the patients with acute pancreatitis and exceeded control values ($p<0.0001$) throughout the 24-hr study period. The lipolytic effect of the inadequate serum insulin concentrations, elevated blood cortisol levels, and hyperglucagonemia produced a rise in the levels of nonesterified fatty acid. Serum gastrin and growth hormone measurements remained within the normal range. Plasma parathyroid hormone and calcitonin concentrations were increased in both patient populations, although calcitonin levels in patients with pancreatitis were significantly lower than those in the control group ($p<0.001$). In patients experiencing a recurrent attack of pancreatitis, plasma glucagon levels were low ($p<0.005$) compared with levels in patients experiencing their first episode of acute pancreatitis. Appreciation of the metabolic derangements in acute pancreatitis that are independent of the normal metabolic changes that occur in response to stress will help to rationalize exogenous endocrine therapy and possibly the prognostic accuracy in this disease.

6338 ENTEROPEPTIDASE LEVELS IN DUODENAL JUICE OF NORMAL SUBJECTS AND PATIENTS WITH GASTROINTESTINAL DISEASE. (Eng.) Rinderknecht, H.; Nagaraja, M. R.; Adham, N. F. (Veterans Admin. Hosp., Sepulveda, CA 91343). *Am. J. Dig. Dis.* 23 (4):327-331; 1978.

To establish a baseline for the study of a possible role of enteropeptidase in gastrointestinal disease in adults, enteropeptidase, trypsin, and chymotrypsin activities in basal and secretin (1 U/kg, i.v.)-stimulated duodenal juice of 20 normal adults and 15 patients with gastrointestinal disease were determined. All enzyme concentrations showed skew distributions, but fluctuations in the secretin-stimulated juices were less pronounced than in the basal secretions. Secretin administration had no influence on the release of enteropeptidase from human duodenal mucosa, but it resulted in a very small increase in secretion of pancreatic enzymes. Six of seven patients with chronic alcoholic pancreatitis or cancer of the pancreas exhibited highly significant elevations of enteropeptidase in their basal as well as secretin-stimulated duodenal juice (152 ± 51.6 and 163.4 ± 28.1 mIU/g protein, resp., compared with 66.6 ± 19.7 and 38.8 ± 6.0 mIU/g in normal controls and 129 ± 33.9 and 112 ± 22.5 mIU/g in patients with gastrointestinal disease). It is suggested that raised luminal enteropeptidase activity may be the result of pancreatic insufficiency or elevated blood glucagon concentrations.

6339 THE SPECTRUM OF COLONIC INVOLVEMENT IN PANCREATITIS. (Eng.) Grodsinsky, C.; Ponka, J. L. (Henry Ford Hosp., 2799 West Grand Blvd., Detroit, MI 48202). *Dis. Colon Rectum* 21(1): 66-70; 1978.

Colonic involvement in pancreatitis is demonstrated

by 3 case histories selected from 14 patients who had colonic involvement of varying severity. In six patients, this complication occurred during the first attack of pancreatitis. Seven other patients had recurrent pancreatitis, and one had no history of pancreatitis. Alcohol was the etiologic factor in 12 cases. In seven patients, the colonic involvement resolved spontaneously. Surgical intervention was required in the other seven cases. Experience with these patients suggests that colonic involvement may be characterized by three patterns of anatomic involvement: (1) early adynamic or localized paralytic ileus, (2) fibrosing or stenosing pericolitis, and (3) colonic necrosis and fistulization. In the first, the extent of involvement is shown radiologically by the cut-off sign, which quickly disappears in response to conservative treatment. When the patient has stenosis secondary to fibrosing pericolitis that may be indistinguishable from malignancy, elective resection is indicated. When necrosis has led to fistulization producing massive bleeding, external drainage of the necrotic collection and proximal colostomy may be the procedure of choice.

6340 NECROSIS OF THE COLON SECONDARY TO PANCREATITIS. (Eng.) Thompson, W. M.; Pizzo, S. V.; Kelvin, F. M.; Rice, R. P. (Duke Univ. Medical Center, Durham, NC 27710). *Am. J. Dig. Dis.* 23(Suppl. 5):92S-96S; 1978.

The case of a 56-yr-old woman who developed radiographic evidence of transverse colon inflammation secondary to acute pancreatitis and who subsequently developed necrosis of the colon is reported. Sixteen years prior to the acute pancreatitis she had had a 90% gastrectomy and gastrojejunostomy. She was a mild diabetic, well-controlled on oral medication. One month after discharge following treatment for pancreatitis and severe inflammation of the colon, she presented with a 2-week history of recurrent severe abdominal pain; on the 10th hospital day, she had gross rectal bleeding and became markedly obtunded. Abdominal radiographs revealed evidence of a pancreatic abscess and changes consistent with necrosis in the splenic flexure. Exploratory laparotomy revealed a necrotic transverse colon with extensive abscess and fat necrosis in the upper retroperitoneal area. Despite transverse colectomy, ileostomy, and drainage of the abscesses, the patient died on the second postoperative day. Pathologic examination of the surgical specimen revealed a markedly thinned colonic wall, numerous erosions of the mucosa, fibrinous adhesions, focal necrosis, acute inflammatory infiltrate and necrosis of the muscle cells of the muscularis, and numerous thrombosed small vessels. Obvious findings of peritonitis were revealed at autopsy. The colon necrosis may have been due to a combination of the dissemination of pancreatic enzymes in the transverse mesocolon and the development of the pancreatic abscess. Because the clinical presentation of ischemic colitis and colon necrosis due to pancreatitis may be masked by the signs and symptoms of the underlying disease, a contrast enema should be performed in all patients suspected of having colonic manifestations of pancreatitis.

6341 PANCREATITIS--A RARE COMPLICATION OF SCHONLEIN-HENOCH PURPURA. (Eng.) Pupala, A. R.; Cheng, J. C.; Steinheber, F. U. (7307 Rustic Valley, Dallas, TX 75248). *Am. J. Gastroenterol.* 69(1):101-104; 1978.

The case of a 54-yr-old woman who developed hemorrhagic pancreatitis as a complication of Schonlein-Henoch purpura is reported. One day after beginning p.o. tetracycline for an upper respiratory infection, she developed a rash over her legs and discontinued the medication. The next day, she presented with arthralgia of the left wrist and right elbow, nausea, epigastric pain, vomiting of coffee-ground material, rectal bleeding, weakness, and dizziness. The day after admission, she developed vague, colicky abdominal pain; on the second hospital day, new erythematous patches appeared over her forehead that were shown by biopsy to be a nonspecific perivasculitis. On the third hospital day, the patient developed severe epigastric pain and tenderness, had a serum amylase level of 340 Somogyi U/100 ml and a urine amylase excretion of 550 U/hr (normal maximum, 300 U/hr). A barium upper gastrointestinal x-ray showed thick duodenal and jejunal folds giving rise to a "stacked coin" appearance. The rash disappeared in 1 week; abdominal pain and fluctuating serum amylase and urine amylase excretion levels gradually decreased. A brief literature review of Schonlein-Henoch purpura is given. The patient had a history of upper respiratory infection and tetracycline treatment, both of which are implicated in the etiology of this syndrome. As there were no other etiological factors, the acute pancreatitis is viewed as a rare complication of the syndrome.

6342 SURGICAL MANAGEMENT OF CHRONIC PANCREATITIS. (Ita.) Petronio, R.; Vantini, I.; Marzoli, G. P.; Piubello, W.; Pederzoli, P.; Puchetti, V.; *et al.* (Clinica Chirurgica II, Universita di Padova, Sede di Verona, Via Mameli 20, Verona, Italy). *Minerva Med.* 68(30):2109-2121; 1977.

6343 CURRENT STATUS OF THE SURGICAL MANAGEMENT OF CHRONIC PANCREATITIS. (Ger.) Mangold, G. (Chirurgische Universitatsklinik, Langenbeckstrasse 1, 6500 Mainz, W. Germany). *Z. Gastroenterol.* 15(2):76-88; 1977.

6344 STATISTICAL CONSIDERATIONS ON A SERIES OF 142 OPERATIONS FOR PRIMARY CHRONIC PANCREATITIS. (Fre.) Doutre, L. P.; Perissat, J.; Pernot, F.; Houdelette, P. (Clinique Chirurgicale A, 311, bd du President Wilson, 33200 Bordeaux, France). *Chirurgie* 103(3):169-176; 1977.

6345 SOME ASPECTS OF THE DIAGNOSIS, PROPHYLAXIS, AND TREATMENT OF POSTOPERATIVE PANCREATITIS. (Rus.) Myasnikov, A. D.; Tronnikov, A. T.; Tronnikova, V. I. (Dept. Operative Surgery and Topographic Anatomy, Kursk Medical Inst., Kursk, USSR). *Vestn. Khir.* 118(4):29-32; 1977.

6346 LIPID ABNORMALITIES AND ACUTE PANCREATITIS. (Eng.) Cameron, J. L. (Dept. Surgery, Johns Hopkins Univ., Baltimore, MD). *Hosp. Prac.* 12(4):95-101; 1977.

6347 DUODENAL NARROWING ASSOCIATED WITH CHRONIC PANCREATITIS. (Eng.) Short, W. F. (Memorial Hosp., North Boulevard and Shaker Rd., Albany, NY 12204). *Am. J. Dig. Dis.* 22(3):241-242; 1977.

6348 PROGNOSTIC SIGNIFICANCE OF HYPERTENSION IN ACUTE PANCREATITIS [Abstract]. (Eng.) Good, L. I.; Long, W. B. (Hosp. Univ. Pennsylvania, Philadelphia, PA 19104). *Gastroenterology* 72(5, Part 2):1064; 1977.

6349 PATHOPHYSIOLOGY OF RUPTURED PSEUDOCYSTS [Abstract]. (Eng.) Bradley, E. L., III (Dept. Surgery, Emory Univ., Atlanta, GA). *Gastroenterology* 72(5, Part 2):1032; 1977.

6350 FEEDING PATIENTS WITH PANCREATIC INSUFFICIENCY [Abstract]. (Eng.) Blackburn, G. L.; Bistrian, B. R.; Falchuk, K.; Trey, C. (New England Deaconess Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2):1171; 1977.

See also, 6239, 6324, 6326, 6450, 6472, 6490, 6499, 6505, 6525.

LIVER AND BILIARY TRACT

6351 α-FETOPROTEIN (AFP) IN BENIGN LIVER DISEASE: EVIDENCE THAT NORMAL LIVER REGENERATION DOES NOT INDUCE AFP SYNTHESIS. (Eng.) Alpert, E.; Feller, E. R. (Massachusetts General Hosp., Boston, MA 02114). *Gastroenterology* 74(5, Part 1):856-858; 1978.

To determine whether the normal regenerating liver produces α-fetoprotein (AFP), 100 sera samples, obtained during the early postoperative period from 11 patients after partial hepatectomy, were assayed for AFP. In addition, AFP was measured in the sera of 199 patients with various forms of both benign viral and nonviral inflammation commonly associated with hepatic regeneration. None of the sera from the 11 posthepatectomy patients was AFP-positive by radioimmunoassay, despite clinical and biochemical recovery associated with normal liver regeneration. AFP was elevated in 29% of patients with acute hepatitis, 34% of patients with chronic active hepatitis, and in 75% of patients with massive hepatic necrosis. The mechanism and significance of AFP elevations in some patients with acute and chronic hepatitis is uncertain, but probably does not reflect normal liver regeneration.

6352 ASSESSMENT OF SEVERITY OF HEPATIC FUNCTIONAL IMPAIRMENT. (Eng.) Preisig, R.; Bircher, J.; Paumgartner, G. (Dept. Clinical Pharmacology, Univ. Berne, Murtenstr. 35, CH-3010 Berne, Switzerland). *Rend. Gastroenterol.* 9(3):228-233; 1977.

To improve the measurement of hepatic functional derangement in humans, animal models were investigated prior to human trials, and three techniques (hepatic uptake, metabolism, and excretion) useful for assessing the severity of liver disease in humans are described. Although sophisticated methods to assess hepatic uptake are available for animals, they are not yet applicable in humans. Yet it is possible to estimate an initial hepatic removal rate from the peripheral disappearance rate following different i.v. doses of indocyanine green by the application of Michaelis-Menten kinetics. When the results obtained in patients with fatty liver or with cirrhosis are compared, the severity of functional impairment is evident from V_{max} and K_m values. Minor degrees of functional derangement may escape detection with this technique. A breath test was developed to analyze hepatic metabolism by measuring hepatic microsomal function. A single dose of 4-dimethyl-^{14}C-amino-antipyrine (DAA, 9 mg/kg p.o.) was given to 20 cirrhotics, and $^{14}CO_2$ was sampled intermittently up to 10 hr following DAA administration. The disappearance rate of $^{14}CO_2$ activity from the breath (K_B) was directly correlated (r=0.90) with the disappearance rate of DAA from the plasma and proportional to the decrease in the galactose elimination capacity (a standard quantitative measure of a specific metabolic function), indicating that the breath test yields quantitative information on hepatic metabolic capacity. A modification of the breath test uses uniformly labeled galactose instead of DAA. In a re-evaluation of the BSP-disappearance curve, it was shown that the first exponential component (K_1) is a sensitive index to discriminate between normal subjects and patients with liver disease, and that the second exponential component (K_2) provides quantitative assessment of excretory function. The quantification of selected metabolic and excretory functions will require additional study to become clinically applicable for the assessment of the severity of hepatic functional derangement.

6353 THE SELECTED BIOCHEMICAL AND IMMUNOLOGICAL EXAMINATIONS IN CHRONIC LIVER DISEASES AND THEIR RELATIONSHIP TO PATHOANATOMICAL FINDINGS OBTAINED BY BIOPSY. (Eng.) Passati, P.; Horejsi, J.; Jezkova, Z.; Fassati, M. (District Medcare Center, Prague 9, Czechoslovakia). *Tijdschr. Gastroenterol.* 20(3):177-190; 1977.

To correlate biochemical and immunological indicators of liver dysfunction with morphological and histological changes, 135 patients with chronic liver disease (≥2 yr duration) underwent liver biopsy and were classified according to five morphological types: steatosis, noncharacteristic histological findings, chronic hepatitis, liver cirrhosis, and ascitic liver cirrhosis. Of the series of laboratory tests performed, 17 biochemical indices were grouped into six categories displaying some similarity in feature or mutual dependence (protein spectrum, turbidity, and flocculation; tests for cholestasis; tests for liver cell integrity; chromosecretion tests; antibody determination tests; and other laboratory tests) and evaluated in relation to the morphological findings. BSP retention and complete chromosecretion BSP curve were the most specific and sensitive indicators of functional liver damage; in chronic hepatitis, cirrhosis, and ascitic cirrhosis, values for BSP excretion were 80%, 92%, and 100% greater than normal, resp. Damage to the integrity of the liver cell, especially in chronic hepatitis and cirrhosis, was reliably indicated by increased γ-glutamyltranspeptidase (γ-GTP), SGTP, and SGOT activities. Increased γ-GTP and alkaline phosphatase levels were also related to biliary lesions. The detection of autoantibodies to liver, gallbladder, and bile duct antigens, while not indicative of the severity of the lesion, was considered useful as an indicator of previous pathological events in the liver. Biochemical tests in conjunction with biopsy may be helpful for the precise diagnosis of the severity and character of liver damage and for the selection and subsequent evaluation of a therapeutic regimen.

6354 PLASMA LIPOPROTEIN ALTERATIONS AND MORPHOLOGIC CHANGES WITH LIPID DEPOSITION IN THE KIDNEYS OF PATIENTS WITH HEPATORENAL SYNDROME. (Eng.) Hovig, T.; Blomhoff, J. P.; Holme, R.; Flatmark, A.; Gjone, E. (Natl. Hosp. Norway, Oslo 1, Norway). *Lab. Invest.* 38(5):540-549; 1978.

Plasma lipoproteins and morphological changes in the kidneys were studied in four patients with advanced liver disease and progressive renal failure compatible with the diagnosis of hepatorenal syndrome. All four patients had low plasma lecithin:cholesterol acyltransferase activity, and the concentration of cholesteryl esters was markedly reduced. The main lipoprotein classes were abnormal with an increased content of polar lipids. Electron microscopy of negatively stained lipoproteins from two patients revealed large particles with layered membranes (700-2,000 A in diameter) corresponding to the large molecular weight fraction of the low density lipoproteins. These structures were not present in the low density lipoproteins from the other two patients. In the renal biopsy from one patient with layered membranes and in the necropsy specimen from the other patient with layered membranes, deposition of osmophilic material was found in the glomeruli (especially located subendothelially), in the basement membrane, and in the mesangial regions. The deposits were similar to those previously described in patients with familial lecithin:cholesterol acyltransferase deficiency and most probably represent cholesterol and phospholipids. It is suggested that the renal deposition of lipid may be related to the large molecular weight low density lipoprotein fraction and that the mechanisms involved in this lipid deposition are similar to those occurring in familial lecithin:cholesterol acyltransferase deficiency.

6355 TRANSVENOUS (TRANSJUGULAR) LIVER BIOPSY: AN EXPERIENCE BASED ON 100 BIOPSIES. (Eng.) Lebrec, D.; Degott, C.; Rueff, B.; Benhamou, J. P. (Hopital Beaujon, 92110 Clichy, France). *Am. J. Dig. Dis.* 23(4):302-304; 1978.

Experience with transvenous (transjugular) liver biopsy in patients in whom percutaneous needle liver biopsy was contraindicated because of massive ascites and/or bleeding tendency is presented. This method consists of taking a liver specimen through a needle introduced into the liver parenchyma from the lumen of a hepatic vein. This procedure was attempted 104 times in 98 patients. A liver specimen was obtained in 100 of these 104 attempts; the tissue specimens were unfragmented and large enough to allow correct evaluation of liver architecture in 57 biopsies. The procedure was followed by no or only minor complications in all patients except one who suffered a fatal intraperitoneal hemorrhage in relation to perforation of the liver capsule; perforation was due to an excessive front rotation applied to the needle, a maneuver which therefore must be avoided. It is concluded that transvenous liver biopsy is a workable, efficient, and acceptably safe procedure for obtaining liver specimens in patients with massive ascites and/or bleeding tendency.

6356 MODIFICATION OF THE LONGMIRE PROCEDURE. (Eng.) Cameron, J. L.; Gayler, B. W.; Harrington, D. P. (Johns Hopkins Hosp., Baltimore, MD 21205). *Ann. Surg.* 187(4):379-382; 1978.

Two modifications of the Longmire procedure of intrahepatic cholangiojejunostomy are described, and a successful application is reported. The first modification involves the preoperative placement under fluoroscopic control of a large Teflon catheter in the distal left hepatic duct to facilitate the identification and isolation of the duct at the time of surgery. The second modification is the use of a transhepatic silastic biliary stent positioned by utilizing the Teflon catheter. These modifications make the Longmire procedure technically much easier and should help insure long-term success in both benign and malignant strictures. This procedure was successfully employed in the

treatment of a 22-yr-old woman who had developed stricture of the left hepatic duct and multiple adhesions in the porta hepatis following resection of the right hepatic lobe that had been fractured by blunt trauma. The patient is asymptomatic 7 months after surgery.

6357 MESOATRIAL SHUNT: A NEW TREATMENT FOR THE BUDD-CHIARI SYNDROME. (Eng.) Cameron, J. L.; Maddrey, W. C. (Johns Hopkins Hosp., Baltimore, MD 21205). *Ann. Surg.* 187(4):402-406; 1978.

A new shunt procedure, the mesoatrial shunt, for decompression of the liver is described. A 56-yr-old woman presented with alcoholic cirrhosis and the Budd-Chiari Syndrome. Because of a thrombosed inferior vena cava, none of the standard portal-systemic shunts could be utilized for decompression of the engorged liver. A new shunt constructed by interposing a Dacron® graft between the superior mesenteric vein and the right atrium was performed. Portal pressure was reduced by the shunt from 30 cm of H_2O to 10 cm of H_2O. Patency has been confirmed postoperatively by catheterization and with angiopathy. The patient is asymptomatic with normal liver function tests nine months following the procedure. A surgical approach is outlined for symptomatic patients with the Budd-Chiari Syndrome that could result in improved survival in patients with this entity.

6358 CELL-MEDIATED CYTOTOXICITY IN CHRONIC ACTIVE LIVER DISEASE: A NEW TEST SYSTEM. (Eng.) Vogten, A. J. M.; Hadzic, N.; Shorter, R. G.; Summerskill, W. H. J.; Taylor, W. F. (Univ. Hosp. Utrecht, Utrecht, Netherlands). *Gastroenterology* 74(5, Part 1):883-889; 1978.

An *in vitro* cytotoxicity system is described for studying patients with chronic active liver disease using as the target cells ^{51}Cr-labeled avian RBC coated with cell membrane lipoprotein extracted from human liver and, as the aggressors, mononuclear cells from peripheral venous blood. The method was tested in patients with liver diseases and in controls. Thirty of 62 patients with chronic active liver disease showed cytotoxicity in this test system as did 5 of 100 apparently healthy controls. In addition, mild cytotoxicity was shown by 2 of 8 patients with the primary biliary cirrhotic syndrome and 2 of 17 persons with other liver diseases. No specific antibody was added to the test system, and the cytotoxicity was inhibited by free lipoprotein, anti-lipoprotein, and by aggregated immunoglobulin. Cytotoxicity also was abolished by the depletion from the mononuclear cells of cells phagocytic for iron filings. The effect of depletion of these phagocytic cells was not restored by the addition of 2-mercaptoethanol. These findings add further evidence that autoimmune responses to liver tissue occur in many patients with chronic active liver disease and, importantly, also suggest that these may occur in some apparently healthy people.

6359 HEPATOCYTE DAMAGE INDUCED BY LYMPHOCYTES FROM PATIENTS WITH CHRONIC LIVER DISEASES, AS DETECTED BY LDH RELEASE. (Eng.) Fernandez-Cruz, E.; Escartin, P.; Bootello, A.; Kreisler, M.; Segovia de Arana, J. M. (Scripps Clinic and Res. Foundation, 10666 North Torrey Pines Rd., La Jolla, CA 92037). *Clin. Exp. Immunol.* 31(3):436-442; 1978.

A cytoplasmic enzyme system was used in the study of the *in vitro* cytotoxic activity of human peripheral blood WBC against isolated liver cells in patients with chronic liver diseases. Lymphocytes from nine primary biliary cirrhosis and eight chronic active liver disease patients were shown to have an *in vitro* capacity to induce a cytolytic effect on isolated hepatocytes, as demonstrated by the enhanced release of LDH ($p<0.001$), a cytoplasmic marker enzyme. No significant LDH release was seen with control lymphocytes of 20 normal persons or with lymphocytes from 10 patients with alcoholic cirrhosis. A new, simple, and reproducible cytoplasmic enzyme system for the study of lymphocyte effector functions was demonstrated. These results corroborate, in a different assay system, that lymphocyte-mediated liver cell damage *in vitro* occurs in both primary biliary cirrhosis and chronic active liver disease.

6360 PRIMARY HEPATIC TUMOR. (Eng.) Alpert, E.; Ferrucci, J.; Athanasoulis, C.; Malt, R. A.; Galdabini, J. (Massachusetts General Hosp., Boston, MA 02114). *Gastroenterology* 74(4):759-769; 1978.

Factors considered in the differential diagnosis of a primary hepatic tumor are discussed by several physicians. The patient was a 25-yr-old woman who had been suffering for 3 months with lower abdominal pain and had a large, hard, right upper quadrant mass. The patient had been taking oral contraceptives for 4 yr and had had a single episode of hepatitis 5 yr before the current illness. The differential diagnoses examined were focal nodular hyperplasia (FNH) and liver cell adenoma (LCA), both benign tumors, and hepatocellular carcinoma. Neither history nor physical examination were useful in determining the nature of the liver mass. A computed tomographic liver scan using iodinated contrast material suggested that the lesion was not especially well-vascularized. Angiographic findings excluded LCA and indicated that the differential diagnosis involved FNH and hepatocellular carcinoma. On the basis of a high serum concentration of alpha-fetoprotein, which has not been detected in any patient with a benign liver tumor, the diagnosis of hepatocellular carcinoma was made. The diagnosis was confirmed following right hepatic lobectomy. This patient is the fifth young person with hepatocellular carcinoma who has either been on birth control pills or has had an abnormality in steroid metabolism, suggesting the involvement of aberrant steroid metabolism in the genesis of these tumors.

6361 HEPATIC TUMORS OF INFANCY AND CHILDHOOD. (Eng.) de Lorimier, A. A. (Sch. Medicine,

Univ. California, San Francisco, CA 94143). *Surg. Clin. North Am.* 57(2):443-448; 1977.

Primary tumors of the liver account for 1.5-2.0% of childhood cancers. Girls more commonly develop focal nodular hyperplasia (female:male, 3.4:1) and hemangioma (2:1), while boys develop hepatoblastoma and hepatocarcinoma 1.3 times more often than do girls. The predominant symptom (in 90%) is an abdominal mass; other complaints include anorexia, weight loss, abdominal or lower chest pain, and vomiting. Laboratory findings may include anemia, polycythemia, hyperlipemia, hypercholesterolemia, elevated levels of serum transaminase, alkaline phosphatase, calcium, globulin, and bilirubin, and low serum levels of albumin, and phosphorus. Radiologic studies, liver scan, ultrasonography, and computerized axial tomography are useful in evaluating the tumor. Resection of the tumor should be attempted if at all possible because this is the only chance for cure (60% for hepatoblastoma and 35% for hepatocarcinoma). The tumor is confined to the right lobe two to three times more often than to the left. Involvement of both lobes or multicentric origin is seen in a third of the patients. There is no correlation between the size of the mass and the prognosis. Operative mortality has been 15-33%, usually due to hemorrhage and transfusion complications. In patients in whom the tumor is unresectable or in whom there is residual tumor, radiotherapy and chemotherapy may be beneficial. Regression has been reported following the use of several drugs now undergoing clinical trials.

6362 HISTOLOGIC AND CYTOLOGIC LIVER CHANGES IN 120 PATIENTS WITH MALIGNANT LYMPHOMAS. (Eng.) Roth, A.; Kolaric, K.; Dominis, M. (Dept. Chemotherapy, Sredisnji Institut za Tumore I Slicne Bolesti, Ilica 197, 41000 Zagreb, Yugoslavia). *Tumori* 64(1):45-53; 1978.

The frequency of liver involvement in malignant lymphomas was determined to assess the value of liver biopsy in the staging of malignant lymphomas. Nonspecific liver changes were also registered. Percutaneous liver biopsy was performed in 120 patients with untreated malignant lymphomas. There were 38 patients with Hodgkin's disease, 42 with histiocytic lymphomas, and 40 with lymphocytic lymphomas. All the biopsy specimens were histologically and cytologically analyzed. Positive liver findings (lymphomatous infiltration) were observed in 27.5% of patients with lymphocytic lymphomas, 23.8% with histiocytic lymphomas, and 7.8% with Hodgkin's disease. Liver involvement in non-Hodgkin's lymphomas was significantly higher ($p<0.025$) than in Hodgkin's disease. In the whole group of patients, there were nonspecific liver changes: chronic persistent hepatitis (in 23), aggressive hepatitis (5), liver steatosis (9), and liver hemosiderosis (4). It is concluded that liver involvement with lymphomatous tissue is more common in non-Hodgkin's lymphomas. Knowledge of this is relevant for clinical staging and the treatment program. These findings also confirm that percutaneous liver biopsy is a valuable diagnostic procedure in the staging of malignant lymphomas.

6363 INCIDENCE AND PATHOPHYSIOLOGY OF PULMONARY EDEMA IN FULMINANT HEPATIC FAILURE. (Eng.) Trewby, P. N.; Warren, R.; Contini, S.; Crosbie, W. A.; Wilkinson, S. P.; Laws, J. W.; *et al.* (King's Coll. Hosp., Denmark Hill, London, SE5, England). *Gastroenterology* 74(5, Part 1):859-865; 1978.

Since pulmonary edema is common in fulminant hepatic failure, its frequency, its clinical effects, and the results of various treatment measures were analyzed. In addition, the respective roles of heart failure and of cerebral edema in the development of pulmonary edema were investigated. Thirty-seven of 100 consecutive patients with fulminant hepatic failure had clinical and radiological evidence of pulmonary edema. None had clinical evidence of left heart failure, and the pulmonary artery wedge pressure measured in 12 patients was normal. Similarly, there was no evidence to incriminate renal failure, endotoxemia, or hypoalbuminemia. However, there was a significantly higher incidence of pulmonary edema in patients with cerebral edema ($p<0.05$), suggesting either a central origin for the pulmonary edema or common factors predisposing to edema in both sites. An additional local factor may have been the presence of intrapulmonary vasodilatation. Detailed isotope studies in 11 patients showed a significantly increased ($p<0.01$) pulmonary extravascular water volume in the patients with pulmonary edema, which was in keeping with the severity of the radiological changes. Although the overall mortality was higher in those patients with pulmonary edema than in those without, the difference was not significant, and early ventilation with positive and expiratory pressure achieved adequate oxygenation in all but three patients.

6364 HEPATIC-PORTAL VENOUS GAS IN ADULTS: ETIOLOGY, PATHOPHYSIOLOGY AND CLINICAL SIGNIFICANCE. (Eng.) Liebman, P. R.; Patten, M. T.; Manny, J.; Benfield, J. R.; Hechtman, H. B. (Boston Univ. Medical Center, Boston, MA 02115). *Ann. Surg.* 187(3):281-287; 1978.

The etiology, pathophysiology, and clinical significance of hepatic-portal venous gas (HPVG) in 60 previously reported cases are reviewed, and 4 new cases, occurring in adults, are presented. HPVG appears as a branching radiolucency extending to within 2 cm of the liver capsule. HPVG is associated with necrotic bowel (72%), ulcerative colitis (8%), intra-abdominal abscess (6%), small bowel obstruction (3%), and gastric ulcer (3%). Mucosal damage, bowel distention, and sepsis predispose to HPVG. The current mortality rate of 75% represents an improvement from previous experience. Analysis of survivors indicates that the finding of HPVG requires urgent surgical exploration except when it is observed in patients with stable ulcerative colitis.

6365 EFFECT OF CHENODEOXYCHOLIC ACID ON SERUM AND BILIARY LIPIDS IN PATIENTS WITH HYPERLIPOPROTEINEMIA. (Eng.) Angelin, B.; Einarsson, K.; Leijd, B. (Karolinska Institutet, Stockholm, Sweden). *Clin. Sci. Mol. Med.* 54(4):451-455; 1978.

To study the effects of chenodeoxycholic acid therapy on serum and biliary lipid levels in hyperlipoproteinemia, chenodeoxycholic acid was administered to seven type IIa, eight type IIb, and eight type IV patients in a daily dose of 750 mg (1.9 mmol) for 3 months. The serum cholesterol and triglyceride concentrations were determined at 4-week intervals; cholesterol remained unchanged, whereas triglycerides decreased 15-20%. In 17 patients, biliary lipids were studied. The proportion of chenodeoxycholic acid in the bile increased from 28.8 ± 1.5 to 72.4 ± 3.6% ($p<0.001$) with reciprocal decreases in cholic and deoxycholic acids ($p<0.001$). Lithocholic acid and ursodeoxycholic acid increased significantly (from 0.2 ± 0.2 to 1.7 ± 0.4%, $p<0.005$ and 0.2 ± 0.2 to 3.2 ± 0.7%, $p<0.001$, resp.). Bile saturation with cholesterol decreased and correlated negatively with the proportion of chenodeoxycholic acid in biliary bile acids ($r=-0.67$, $p<0.001$) but positively with serum triglycerides ($r=+0.48$, $p<0.01$). It is concluded that chenodeoxycholic acid treatment in hyperlipoproteinemia is associated with a parallel fall in serum triglycerides and biliary cholesterol and thus may prove to be a useful adjunct in hypolipemic treatment.

6366 ORAL CONTRACEPTIVES AND FOCAL NODULAR HYPERPLASIA OF THE LIVER: TWO CASE REPORTS WITH ELECTRON-MICROSCOPIC STUDIES. (Eng.) Balazs, M.; Gergely, R.; Kostic, Sz. (Janos Hosp., Diosarok u. 1, H-1125 Budapest, Hungary). *Acta Hepatogastroenterol. (Stuttg.)* 25(2):111-118; 1978.

Case histories are presented for two women (aged 26 and 36 yr) who had been on oral contraceptives for 2 and 6 yr, resp., and who developed focal nodular hyperplasia of the liver. In both cases, the tumors were discovered as subsidiary findings during cholecystectomy. The diagnosis was confirmed histologically and in one case the tumor was studied electron microscopically. The most outstanding feature of the electron microscopic study was abnormal vascularization. It is hypothesized that abnormal regeneration in the circumscribed areas of the liver is responsible for the disturbed microcirculation. Radical removal of the tumor and discontinuing oral contraceptives are recommended.

6367 JAUNDICE DURING PREGNANCY. (Fre.) Darnis, F. (Hopital Saint-Antoine, 184, rue du faubourg Saint-Antoine, 75012 Paris, France). *Rev. Prat. (Paris)* 27(53):3683-3692; 1977.

Jaundice during pregnancy is classified into types, normal changes in the liver due to pregnancy are discussed, and three varieties of jaundice in pregnancy (recurring cholestasis, acute liver steatosis, and viral hepatitis) are described. Jaundice occurring during pregnancy may be caused or exacerbated by the pregnancy itself, such as recurring cholestasis or acute liver steatosis, or it may be coincidental, as with viral hepatitis, which causes 70% of all icterus during pregnancy. Cholestasis, which usually recurs with increasing severity during successive pregnancies, affects women with a genetic predisposition towards cholestasis triggered by the high hormonal levels during the third trimester. Such women should never take oral contraceptives, since these may cause the same problem. The disease is almost always benign in the mother, and the jaundice and pruritus resolve spontaneously after parturition; however, fetal prematurity approaches 50% and fetal mortality is over 15%. Acute hepatic steatosis occurs during the third trimester of the first pregnancy. A severe icterus accompanied by hepatomegaly, hemorrhagic syndrome, and encephalopathies leads almost always to the expulsion of a dead fetus followed in a few days by the death of the mother. Massive doses of tetracycline have been implicated in some cases, but the similarity to Reye's syndrome suggests a genetic deficiency in ornithinetranscarbamylase activity. Viral hepatitis contracted during the first trimester is usually benign to mother and child, but when it occurs during the third trimester it may cause premature births in 50% of cases. The frequency of viral transmission to the fetus is practically nil during the first trimester, 25% during the second, and 80% during the third. Passive immunization of the newborn is recommended when the mother either has hepatitis B (HB) or is a chronic carrier of the HB surface antigen.

6368 HYPERPLASIA AND PROLAPSE OF HEPATOCYTES INTO HEPATIC VEINS DURING LONGTERM METHYLTESTOSTERONE THERAPY: POSSIBLE RELATIONSHIPS OF THESE CHANGES TO THE DEVELOPMENT OF PELIOSIS HEPATIS AND LIVER TUMOURS. (Eng.) Paradinas, F. J.; Bull, T. B.; Westaby, D.; Murray-Lyon, I. M. (Charing Cross Hosp. and Medical Sch., London W6, England). *Histopathology* 1(4):225-246; 1977.

The pathological changes in liver biopsies from 10 patients (4 female transexuals and 6 impotent men) after treatment with 150 mg methyltestosterone daily for periods of up to 3 yr are reported; in addition, changes in a hemihepatectomy specimen from a female transexual who developed a liver adenoma after 37 months of this treatment are presented. Hepatocyte hyperplasia and mild focal sinusoidal dilatation was found in most cases. In some cases, there were microcysts and dissociation of hepatocytes. In nine patients, there was accumulation of hepatocytes between the endothelium and the supporting collagen of hepatic vein, which often resulted in either partial occlusion of their lumina or disruption of their walls. These vascular changes do not appear to have been reported before. It is postulated that a single pathological process--hyperplasia, perhaps related to the anabolic effect of methyltestosterone--could be partly responsible both for the formation of cysts through mechanical obstruction of hepatic veins and for the formation of nodules and tumors.

6369 ERYTHROPOIETIC PROTOPORPHYRIA: HEPATIC CIRRHOSIS. (Eng.) Cripps, D. J.; Goldfarb, S. S. (1300 University Ave., Madison, WI 53706). *Br. J. Dermatol.* 98(3):349-354; 1978.

Liver pathology and function were studied in 12 patients with erythropoietic protoporphyria (EPP). Needle liver biopsies in 3 of 11 patients showed mild portal or periportal fibrosis without evidence of abnormal liver function. The 12th patient died from hepatic cirrhosis and failure at the age of 11 yr, the youngest yet reported. He was not suspected of pending liver disease until 3 months before death. The quantity of protoporphyrin present in his liver was approximately 5.75% of total liver weight. Fatal liver disease in EPP has occurred in 13 patients described in the literature, 7 men and 6 women, in which the mean age of death was 38 yr. The seriousness of hepatic complications in EPP suggests that patients with EPP should have regular assessment of hepatic function.

6370 WILSON'S DISEASE, PRESENTING AS CHRONIC ACTIVE HEPATITIS. (Eng.) Scott, J.; Gollan, J. L.; Samourian, S.; Sherlock, S. (Royal Free Hosp., London, NW3 2QG, England). *Gastroenterology* 74(4):645-651; 1978.

The clinical course and prognosis of 17 patients with Wilson's disease (mean age 12 years) who presented with clinical, biochemical, and morphological features similar to those of chronic active hepatitis (CAH) are discussed. Neurological dysfunction was evident in only three patients (mean age, 18 hr); Kayser-Fleischer rings were absent in eight patients (mean age, 9.5 yr), and the serum ceruloplasmin and copper levels were normal in three patients with severe hepatic failure. Smooth muscle, mitochondrial, antinuclear, and hepatitis B surface antigen antibodies were negative in all patients. The levels of serum aminotransferases and γ-globulins were elevated in all patients. Cirrhosis was present on initial liver biopsy in 15 patients. Despite D-penicillamine therapy (1.0 to 3.0 g daily), four patients died within 3 weeks of diagnosis from fulminant hepatic failure associated with hemolysis. A further five patients died within 2 yr as a result of hepatic failure (3 patients), variceal hemorrhage (1), and a lupus-like syndrome (1). A sustained improvement was observed in eight patients who remain well (mean survival time, 7 yr) with near normal liver function tests and inactive hepatic histology. Wilson's disease patients presenting as CAH frequently exhibit atypical features: Kayser-Fleischer rings and neurological dysfunction can be absent and both serum ceruloplasmin and serum copper can be normal especially if there is severe hepatocellular necrosis. As a result, diagnosis of Wilson's disease may be delayed, and once cirrhosis is established this form of Wilson's disease can have a poor prognosis despite D-penicillamine therapy. It is essential, therefore, that the diagnosis of Wilson's disease be excluded in all patients with CAH and chronic parenchymal liver disease of unknown etiology so that an optimum treatment response to D-penicillamine can be achieved.

6371 HEPATIC AND VENA CAVAL INJURIES. (Eng.) Madding, G. F.; Lim, R. C.; Kennedy, P. A. (Sch. Medicine, Univ. California, San Francisco, CA 94143). *Surg. Clin. North Am.* 57(2):275-289; 1977.

The evaluation and treatment of hepatic and vena caval injuries are reviewed. Blunt injuries, as compared to stab or bullet wounds, frequently cause the most serious derangement of liver integrity. The peripheral venous hematocrit and abdominal paracentesis are useful in evaluating acute liver injury, while angiography and liver scans are not. The techniques used in the control of bleeding from liver injuries dictate, to a significant degree, the morbidity and mortality associated with the injury and include the use of gauze packs placed over the site of injury, suturing the individual vessels, resectional debridement, and rarely, sublobar resection. If metal fragments are present and readily accessible, they should be removed; but if extensive surgery would be required, they are best left in place. Subcapsular hematoma, if encountered at surgery, should be opened, followed by control of bleeding points, and removal of any pulpified liver. Retroperitoneal hematomas should be left alone unless expanding or bleeding. In cases where injury to the portal vein cannot be adequately repaired, it may be acutely ligated with safety. Injuries to the intrahepatic portion of the inferior vena cava with extensive liver parenchymal damage and lacerations of the major hepatic veins cause the majority of immediate deaths. Various types of antibiotics are sometimes used as solutions for irrigating the peritoneal cavity before wound closure, and broad-spectrum antibiotics started before or during surgery should be continued postoperatively.

6372 SOLITARY LIVER CYST TREATED BY CYSTO-GASTROSTOMY. (Eng.) Lock, M. R. (Westminster Hosp., London SW1, England). *Proc. R. Soc. Med.* 70(8):551-552; 1977.

6373 HEPATIC IRON UPTAKE IN TREATED HAEMOCHROMATOSIS [Abstract]. (Eng.) Batey, R.; Pettit, J.; Nicholas, A. W.; Sherlock, S. (Royal Free Hosp., London, England). *Clin. Sci. Mol. Med.* 53(3):14P; 1977.

6374 ACUTE FULMINANT LIVER FAILURE. (Eng.) Willson, R. A. (Univ. Washington Sch. Medicine, Seattle, WA). *Hosp. Med.* 13(10):8-23; 1977.

6375 CRITICAL WOUNDS OF THE LIVER AND JUXTAHEPATIC VEINS. (Eng.) Mays, E. T. (340 Bogle St., Somerset, KY 42501). *Am. Surg.* 43(10):635-655; 1977.

6376 5(4)-AMINO-4(5)-IMIDAZOLE CARBOXAMIDE UREIDOSUCCINATE: BIOPSY FINDINGS AFTER "CONTROLLED" USE OF THE NEW SUBSTANCE IN THE THERAPY OF LIVER DISEASES. (Ita.) Cavazzuti, F. (Ospedale

S. Maria della Misericordia, Rovigo, Italy). *Clin. Ter.* 83(3):243-277; 1977.

6377 ERYTHROCYTE LIPID COMPOSITION AND SODIUM TRANSPORT IN HUMAN LIVER DISEASE [Abstract]. (Eng.) Owen, J. S.; McIntyre, N. (Royal Free Hosp., Pond St., London, England). *Digestion* 16(4):347; 1977.

6378 SERUM HYOCHOLATE LEVELS IN PATIENTS WITH INTRAHEPATIC CHOLESTASIS (IHC) BEFORE AND DURING TREATMENT WITH PHENOBARBITAL [Abstract]. (Eng.) Back, P.; Gerok, W. (Medizinische Klinik der Universitat, Freiburg i. Br., W. Germany). *Digestion* 16(4):343-344; 1977.

6379 TREATMENT OF HBeAG-POSITIVE AND HBeAG-NEGATIVE CHRONIC ACTIVE LIVER DISEASE [Abstract]. (Eng.) Maier, K. P.; Lepiorz, H.; Berthold, H.; Gerok, W. (Dept. Medicine, Univ. Freiburg, Freiburg i. Br., W. Germany). *Digestion* 16(4):357; 1977.

6380 THE RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM IN FULMINANT HEPATIC FAILURE [Abstract]. (Eng.) Bernardi, M.; Wilkinson, S. P.; Poston, L.; Wernze, H.; Spech, H. J.; Williams, R. (King's Coll. Hosp. Medical Sch., London, England). *Digestion* 16(4):350; 1977.

6381 THE ROLE OF PLASMA LECITHIN-CHOLESTEROL ACYL TRANSFERASE ACTIVITY IN THE LIPOPROTEIN ABNORMALITIES OF PARENCHYMAL LIVER DISEASE [Abstract]. (Eng.) Day, R. C.; Harry, D. S.; Fox, C.; Owen, J. S.; McIntyre, N. (No affiliation given). *Digestion* 16(4):334; 1977.

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6391 DECREASED UPTAKE OF ^{67}GALLIUM CITRATE (^{67}Ga) BY A BACTERIAL HEPATIC ABSCESS: REPORT OF A CASE. (Eng.) Gooneratne, N. S.; Imarisio, J. J. (South Carolina Hosp., 171 Ashley Ave., Charleston, SC 29403). *Gastroenterology* 73(5):1147-1148; 1977.

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6405 PLASMA AMINO-ACIDS: THEIR ROLE AS AN INDICATOR OF HEPATOCELLULAR DYSFUNCTION [Abstract]. (Eng.) Morgan, M. Y.; Milsom, J. P.; Sherlock, S. (Royal Free Hosp., Hampstead, London, England). *Gut* 18(5):A402; 1977.

6406 DISCRIMINATORY FUNCTION OF SERUM PROTEINS IN HEPATOBILIARY DISEASES. (Ger.) Nilius, R.; Zipprich, B.; Otto, L.; Busse, H. J. (I. Medizinische Universitatsklinik, Klinikum Krollwitz, Ernst-Grube-Strasse, PSF 63, DDR-401 Halle [Saale], E. Germany). *Z. Gesamte Inn. Med.* 32(12): 265-270; 1977.

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6409 HISTOGRAM IN HEPATIC DENSITOMETRY [Abstract]. (Fre.) Lamarque, J. L.; Bruel, J. M.; Dondelinger, R.; Vendrell, B. (Hopital Saint-Eloi, F 34000 Montpellier, France). *Gastroenterol. Clin. Biol.* 1(8/9):714; 1977.

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6413 LOWER AMINES IN BLOOD AND URINE IN CHRONIC DISEASES OF THE LIVER AND KIDNEY. (Ger.)

Martin, R.; Pohl, A.; Rotzsch, W. (Medizinische Klinik der Karl-Marx-Universitat, DDR-701 Leipzig, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 37 (2):85-88; 1977.

6414 ROUTINE LONG-TERM INTRAMUSCULAR TREATMENT WITH HEPASTERIL® IN CHRONIC HEPATOPATHY: REPORT ON THERAPEUTIC EXPERIENCE. (Ger.) Laque, R. (Hohenzollernstrasse 77, 6700 Ludwigshafen/Rhein, W. Germany). *Therapiewoche* 27(45):8189-8190; 1977.

See also, 5987, 6003, 6047, 6062, 6063, 6079, 6244, 6419, 6421, 6448, 6453, 6456, 6463, 6465, 6467, 6475, 6476, 6490, 6499, 6500, 6508, 6511, 6520, 6524, 6537, 6548, 6553.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

6415 THE ORGANELLE PATHOLOGY AND DEMONSTRATION OF MITOCHONDRIAL SUPEROXIDE DISMUTASE DEFICIENCY IN TWO PATIENTS WITH DUBIN-JOHNSON-SPRINZ SYNDROME. (Eng.) Peters, T. J.; Seymour, C. A. (Royal Postgraduate Medical Sch., Du Cane Rd., London W12 OHS, England). *Clin. Sci. Mol. Med.* 54(5):549-553; 1978.

To discover what, if any, enzyme deficiencies are involved in the Dubin-Johnson-Sprinz syndrome, analytical subcellular fractionation and marker enzyme microassays were used to study hepatic organelle pathology in liver biopsy specimens from two patients with the syndrome and from seven controls. Total (unfractionated) marker enzyme activities were very similar in the patients and controls except for a threefold increase in the activity of the lysosomal enzyme *N*-acetyl-β-glucosaminidase (2.03 ± 0.28 versus 7.55 and 6.64 mU/mg protein in the controls and 2 patients, resp.) and small increases in the activities of the three plasma membrane marker enzymes, alkaline phosphatase, 5'-nucleotidase, and leucyl-2-naphthylamidase (1.35 ± 0.17, 2.55, and 2.89; 13.7 ± 2.4, 18.3, and 20.9; and 1.28 ± 0.17, 3.98, and 3.69 mU/mg protein in the controls and 2 patients, resp., for each enzyme, resp.). When organelle marker enzymes were examined by sucrose density gradient centrifugation for the distribution of particulate enzyme activities, several differences between patients and controls were revealed. The distributions of acid phosphatase and *N*-acetyl-β-glucosaminidase varied between the two groups, with a marked decrease in lysosomal median density in the patients. In the controls, superoxide dismutase activity was largely soluble (remaining in the starting layer) with a distinct particulate peak (5-10% of total activity) at a position corresponding to that of malate dehydrogenase, but this distinct mitochondrial peak was absent in the patients. There was also a marked decrease in the median density of the endoplasmic reticulum marker, neutral α-glucosidase, in the patients. It is hypothesized that superoxide dismutase inhibits the formation of lipid peroxides and thus lipofuscin pigments by preventing the interaction of free O_2^- radicals with fatty acid components of membrane lipids. When lysosomes degrade mitochondria (these organelles have a half-life of 10 days), the accumulated lipofuscin is transferred to the lysosomes where it remains in increasing quantities, being relatively undegradable. The source of the melanin and of the impairment of conjugated bilirubin excretion in Dubin-Johnson-Sprinz syndrome is still not clear.

6416 HEREDITARY DISORDERS OF BILIRUBIN METABOLISM. (Spa.) Wolpert, E.; Robles, G.; Suarez de la Torre, G. I.; Lisker, R.; Villarreal, E.; Wolkoff, A. W.; *et al.* (Instituto Nacional de la Nutricion, Viaducto Tlaplan y Av. San Fernando, Mexico 22, DF). *Rev. Invest. Clin. (Mex.)* 30(1): 49-57; 1978.

See also, 5989.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

6417 BOTRYOMYCOSIS AS AN OBSTRUCTIVE HEPATIC DISEASE. (Eng.) Bagby, G. C., Jr.; Gunning, J. J. (Veterans Admin. Hosp., Sam Jackson Park, Portland, OR 97207). *Arch. Intern. Med.* 138 (3):472-473; 1978.

The case of a previously well patient who initially had apparent hepatitis due to *Pseudomonas aeruginosa* that spread hematogenously to involve both lungs is presented. The patient, a 20-yr-old man, presented with malaise, anorexia, dark urine, scleral

icterus, diarrhea, and mild abdominal pain. The patient rapidly developed both obstructive biliary and miliary pulmonary disease. Cultures of hepatic tissue grew *Pseudomonas*, but this was thought to be a contaminant. A liver scan showed a filling defect. *P. aeruginosa* appeared in the sputum and urine cultures as well as cultured lung tissue. At laparotomy, there was hepatosplenomegaly, small mesenteric microabscesses, and small, white nodular, firm lesions beneath the hepatic capsule. All cultures of pus from multiple abscesses and of hepatic tissue grew *P. aeruginosa*. The patient responded to drainage of the abscesses and to gentamicin therapy. Twelve months postoperatively, all liver function studies, including liver scans and an i.v. cholangiogram were normal. Although the causative organism in this case probably arose from normal intestinal flora, the mode of transmission to the liver is unknown. Nonetheless, this case exemplifies the previously described progressive subacute course of disseminated botryomycosis, the lack of underlying host defense abnormalities, and the importance of tissue diagnosis by special stains and culture of the involved organs.

6418 MASSIVE HEPATIC NECROSIS ASSOCIATED WITH DANTROLENE THERAPY. (Eng.) Donegan, J. H.; Donegan, W. L.; Cohen, E. B. (Milwaukee County General Hosp., 8700 West Wisconsin Ave., Milwaukee, WI 53226). *Am. J. Dig. Dis.* 23(Suppl. 5):48S-52S; 1978.

The case of a 53-yr-old woman who had been treated for the neurological symptoms of multiple sclerosis for 4 months with dantrolene (200 mg. q.i.d.), Vistaril (25 mg, q.i.d.), and Dalmane (30 mg before retiring) and who developed jaundice, ascites, depressed pulmonary function, and oliguria is presented. Despite i.v. fluid therapy, diuretics, antibiotics, parenteral salt-poor albumin, and vitamins A, D, and K, the patient's condition declined progressively, and she died in hepatic and renal failure on the 9th hospital day. An autopsy revealed that the liver architecture was markedly distorted by extensive parenchymal necrosis and that the reticulin framework was collapsed although there was little fibrosis. The remaining parenchymal cells exhibited fine vacuolization, intracellular cholestasis, and formation of pseudogranular structures, many of which contained bile plugs. A moderate inflammatory infiltrate was present in the lobules, consisting of both lymphocytes and granulocytes, and the Kupffer cells contained phagocytized debris. The usual lobular pattern of the liver was blurred. Esophageal varices and 2,700 ml of ascites were present. The kidneys showed gross and microscopic changes compatible with acute tubular necrosis. Although the hepatocellular necrosis was relatively nonspecific, in the absence of other causes for this damage, the authors believe the injury to have been caused by dantrolene.

6419 HOW SAFE IS ISONIAZID? (Eng.) Thompson, J. E. (Health Commission of New South Wales, 86-88 George St., Sydney, New South Wales 2000, Australia). *Med. J. Aust.* 1(3):165-169; 1978.

To determine the safety of isoniazid (INH) for the treatment or chemoprophylaxis of tuberculosis in Australian patients, the complications of INH treatment were studied in 1,033 patients who had received INH for at least 18 months with or without other drugs. Hepatitis developed in 25 patients; this was attributed to rifampicin (15 cases), infectious hepatitis (3 cases), INH alone (3 cases), INH possibly exacerbating chronic liver disease (2 cases), and multiple drug treatment (2 cases). Central nervous system disorders (mainly peripheral neuropathy) due to INH occurred in 12 patients, all of whom were over the age of 40 yr. Hypersensitivity to INH developed in 12 patients. When the risk of hepatitis was compared with the risks of developing or dying from tuberculosis, it was found that the benefits of INH chemoprophylaxis outweighed the risks, particularly in patients who were less than 50 yr of age. The findings suggest that, in an Australian population, INH can still be regarded as an extremely safe drug, particularly in nonalcoholic patients, and the safest drug available for the chemoprophylaxis of tuberculosis.

6420 HEPATIC DYSFUNCTION FOLLOWING METHYPRYLON INTOXICATION. (Eng.) Loiudice, T. A.; Buhac, I.; Peng, S. K.; Dillard, P. (Albany Medical Coll., Albany, NY 12208). *Am. J. Dig. Dis.* 23 (Suppl. 5):33S-37S; 1978.

The case history of a 63-yr-old man who developed hepatic dysfunction following methyprylon intoxication is presented. The patient attempted suicide by ingesting 29 capsules (8.7 g) of methyprylon. At the time of admission (5 hr after ingestion), the patient was comatose and responsive only to deep pain. He was treated by gastric lavage and i.v. fluids, began to awaken 4 hr after admission, and became fully awake without signs of physical or neurological deficit after 48 hr. Whereas initial laboratory studies had been normal, studies on the fifth hospital day indicated abnormal liver function (SGOT, 177 mU/ml; alkaline phosphatase, 576 mU/ml; total bilirubin, 1.8 mg/dl; 5'-nucleotidase, 29.3 mU/ml) that persisted 2 weeks. Liver scan was normal. A liver biopsy on the 14th hospital day revealed hydropic swelling of hepatic cells, cellular disarray, disruption of hepatic cords, and the presence of periportal inflammation and regenerating hepatocytes. Evidence of a moderate cholestasis was present, but there was no evidence of centrilobular necrosis. The patient continued his recovery and was discharged 1 month after admission. Although methyprylon must now be added to the list of drugs capable of causing hepatic injury, its wide usage in the treatment of insomnia indicates that this toxicity must be extremely rare.

6421 NON-MECHANICAL HEMORRHAGE IN SEVERE LIVER INJURY. (Eng.) Clagett, G. P.; Olsen,

W. R. (Walter Reed Army Medical Center, Washington, DC 20012). *Ann. Surg.* 187(4):369-374; 1978.

Experience with coagulopathy, or nonmechanical bleeding, associated with severe liver injury is reviewed in an attempt to elucidate its pathogenesis and formulate methods of prevention and treatment. Coagulopathy complicated the operative course of 17 of 33 patients suffering severe liver trauma. The highest incidence of nonmechanical hemorrhage (12/18) occurred in patients undergoing anatomic lobectomy. Serial hemostatic parameters were assessed and thrombocytopenia was the most striking abnormality in patients with nonmechanical hemorrhage. The degree of thrombocytopenia was directly correlated with the number of blood transfusions administered ($r=-0.79$, $p<0.001$). The mean operative blood transfusion requirement was significantly greater in patients with nonmechanical hemorrhage (25.1 ± 2.87 U) than in those without (12.2 ± 1.83 U, $p<0.001$). The bulk of this transfusion was given before the onset of clinically overt coagulopathy. Massive transfusion of stored blood was felt to be the most important factor in causing nonmechanical hemorrhage. Convincing evidence for disseminated intravascular coagulation was lacking, and abnormal fibrinolysis was infrequent and mild when observed. Although uneventful in most, in six patients nonmechanical hemorrhage resulted in excessive blood transfusion, unnecessary operation, or death. Infusions of platelet concentrate, fresh frozen plasma, and fresh blood were used to treat successfully most cases of nonmechanical hemorrhage. In all cases, these components were not started until nonmechanical hemorrhage was clinically apparent. The value of prophylactic use of blood components is stressed. Because of troublesome side-effects associated with the use of prothrombin complex concentrates, these agents are contraindicated in patients with severe liver injury. After receiving concentrates, one patient developed severe hypotension leading to ventricular fibrillation, two developed transient thrombocytopenia, and two others demonstrated multiple pulmonary microthrombi at autopsy, a finding not observed in autopsied patients not receiving the concentrates. Prothrombin concentrates appear to be contraindicated in patients with severe liver injury.

6422 LIVER DAMAGE DUE TO ADELPHAN. (Ger.) Enat, R.; Rader, G.; Barzilai, D. (Rambam Univ. Hosp., Aba Khoushy Sch. Medicine, Haifa, Israel). *Schweiz. Med. Wochenschr.* 107(19):657-658; 1977.

6423 DIHYDRALAZINE-INDUCED HEPATITIS. (Ger.) Paumgartner, G. (Institut fur Klinische Pharmakologie der Universitat, Murtenstrasse 35, CH-3010 Bern, Switzerland). *Schweiz. Med. Wochenschr.* 107(19):649-650; 1977.

6424 INTERPLAY OF FACTORS LEADING TO ADVERSE DRUG REACTIONS IN THE LIVER, A PERSONAL VIEWPOINT. (Eng.) Schaffner, F. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Yale J. Biol. Med.* 50(5):489-495; 1977.

See also, 5967, 6351, 6363, 6397, 6401.

Acute Viral Hepatitis

6425 HEPATITIS A VIRUS INFECTION IN FULMINANT HEPATITIS AND CHRONIC ACTIVE HEPATITIS. (Eng.) Rakela, J.; Redeker, A. G.; Edwards, V. M.; Decker, R.; Overby, L. R.; Mosley, J. W. (Rancho Los Amigos County Hosp. [1100 Bldg.], 7601 E. Imperial Highway, Downey, CA 90242). *Gastroenterology* 74(5, Part 1):879-882; 1978.

Studies were carried out in 72 patients with fulminant hepatitis and 35 with chronic active hepatitis to determine whether hepatitis A virus (HAV) could be implicated in the etiology of these diseases. Among the 42 patients with hepatitis B surface antigen (HBsAg)-negative fulminant disease, seroconversion was detected by immune adherence hemagglutination for antibody to HAV (anti-HAV) in 3 of 10 survivors, as well as an increasing anti-HAV score by immune electron microscopy. In the 32 HBsAg-negative nonsurvivors, 3 patients were found with anti-HAV detectable by immune electron microscopy and radioimmunoassay, but not by immune adherence hemagglutination. The latter cases were classified as presumptively attributable to HAV. In 10 survivors among 30 HBsAg-positive patients with fulminant disease, no instances of anti-HAV seroconversion were detected. In the 20 HBsAg-positive nonsurvivors, 1 case had anti-HAV detectable by immune electron microscopy and radioimmunoassay but not by immune adherence hemagglutination. This case was also considered to be presumptively caused by HAV. Anti-HAV was studied in patients with chronic active hepatitis. The incidence of anti-HAV in 13 HBsAg-positive cases was 31%, which did not differ from the 32% found in 22 HBsAg-negative

cases. There was one seroconversion for anti-HAV in one patient with HBsAg-negative chronic active hepatitis, but this appeared to be an epiphenomenon. Fecal shedding of HAV patients with HBsAg-negative chronic active hepatitis was not present in any of 14 patients tested. The failure to find HAV in fecal specimens from patients with chronic active hepatitis does not preclude an etiological relationship between this agent and chronic disease, but it represents initial evidence against that hypothesis. The finding that the frequency of anti-HAV is the same in patients with HBsAg-positive as HBsAg-negative chronic active hepatitis argues against a significant role of HAV in these cases.

6426 PREVALENCE OF HEPATITIS A AND B INFECTIONS IN MULTIPLY TRANSFUSED THALASSAEMIC PATIENTS. (Eng.) Papaevangelou, G.; Frosner, G.; Economidou, J.; Parcha, S.; Roumeliotou, A. (Athens Sch. Hygiene, Athens 602, Greece). *Br. Med. J.* 1(611):689-691; 1978.

Thalassemia patients who receive regular blood transfusions and who live in an area in which hepatitis is highly endemic were studied to determine the prevalence of hepatitis A virus (HAV) and hepatitis B virus (HBV) infections in these patients and to evaluate the role of blood transfusions in hepatitis A and B transmission. Evidence of HBV and HAV infections was sought in 148 multiply transfused patients with homozygous B-thalassemia and in healthy controls (2,040 for HBV and 217 for HAV). The prevalence of the HBV surface antigen (HBsAg) or antibody to it (anti-HBs) was significantly higher ($p<0.001$) in patients (90.5%) than in controls (17.3%) and it increased with the number of blood transfusions (82.5, 93.5, and 92.5% for patients with <100, 100-199, and ≥200 transfusions, resp.). In contrast, the prevalence of antibody to HAV was significantly lower ($p<0.001$) in patients than in controls (59.9%) and it decreased with the number of blood transfusions (21.0, 15.2, and 8.4% for patients with <100, 100-199, and ≥200 transfusions, resp.). Anti-HAV was significantly more prevalent ($p<0.05$) among the controls who were positive for HBsAg or anti-HBs (28/36) than among patients who were positive for HBsAg or anti-HBs (17/134). These results support the view that blood transfusion does not play any appreciable part in transmitting HAV. Indeed, regular blood transfusion, where donors almost all have HAV antibody, seems to give protection against infection.

6427 SEROLOGIC AND ANIMAL INOCULATION STUDIES OF A COMMUNAL OUTBREAK OF VIRAL HEPATITIS, TYPE A. (Eng.) Barker, L. F.; Dienstag, J. L.; Lorenz, D. E.; Purcell, R. H.; Wong, D. C.; Feinstone, S. M.; *et al.* (Div. Blood and Blood Products, Bureau Biologics, 8800 Rockville Pike, Bethesda, MD 20014). *Am. J. Med. Sci.* 274(3):247-253; 1977.

Sera from individuals in an outbreak of viral hepatitis in a multifamily household, probably spread by contaminated food, were studied for antibodies to hepatitis A virus (anti-HAV), and selected acute phase sera were inoculated into marmosets, to establish the etiology of this outbreak. Testing for anti-HAV was done by the immune adherence hemagglutination (IAHA) method, and the value of this procedure was assessed. Significant rises in anti-HAV titers between acute and convalescent sera occurred in all of 15 individuals in the outbreak who experienced serum enzyme elevations and in 1 of 14 individuals whose serum enzyme levels remained normal. The remaining 13 individuals in the latter group had antibody levels in both early and late sera compatible with residual immunity from prior HAV infections and correlating with resistance to reinfection. Groups of marmosets were infected with acute phase sera from two of the cases; in both instances the inoculated sera contained substantial levels of anti-HAV. The marmosets developed specific anti-HAV seroconversions as well as enzyme elevations. The results are indicative of the value of the IAHA test for establishing the etiologic agent in an outbreak of hepatitis. This study adds intrafamily spread to the already serologically established settings of HAV transmission.

6428 PREVALENCE OF HEPATITIS B IN A HIGH-RISK SETTING: A SEROLOGIC STUDY OF PATIENTS AND STAFF IN A PEDIATRIC ONCOLOGY UNIT. (Eng.) Tabor, E.; Gerety, R. J.; Mott, M.; Wilbur, J. (Bureau Biologics, Bldg. 29, Rm. 311, 8800 Rockville Pike, Bethesda, MD 20014). *Pediatrics* 61(5): 711-715; 1978.

The prevalence of serologic markers for hepatitis B virus (HBV) was evaluated among 188 patients and 158 employees in a pediatric oncology unit. Evidence of past or present HBV infection was detected in 33 patients and in 25 employees. The prevalence was higher among patients receiving chemotherapy (19%) than among those not receiving chemotherapy (7%). The prevalence of HBV serologic markers, while much higher than generally found among healthy children in the United States, was low compared to previously reported prevalences in such settings, and may reflect the use in recent years of blood and blood products screened by "third generation" methods (radioimmunoassay and reversed passive hemagglutination) for hepatitis B surface antigen and the use of all volunteer blood donors. This prevalence suggests that there may be less urgent need for the use of hepatitis B immune globulin and hepatitis B vaccine (when it becomes available) in oncology units than had been anticipated from earlier data in oncology units.

6429 TRANSMISSION OF HEPATITIS B VIRUS INFECTION BY TRANSFUSION OF FROZEN-DEGLYCEROLIZED RED BLOOD CELLS. (Eng.) Alter, H. J.; Tabor, E.; Meryman, H. T.; Hoofnagle, J. H.; Kahn, R. A.; Holland, P. V.; *et al.* (Blood Bank Dept., Bldg. 10A/Rm. 1E33, Clinical Center, NIH, Bethesda MD 20014). *N. Engl. J. Med.* 298(12):637-642; 1978.

Chimpanzees were used to determine the ability of prior freezing of RBC to prevent the transmission of type B post-transfusion hepatitis.

Four units of human whole blood were each inoculated with 10^6 infectious doses of hepatitis B virus. Although all units became hepatitis B surface antigen (HBsAg) negative after freezing and deglycerolization, hepatitis B virus infection developed in all four chimpanzees when these units were transfused. Two of these chimpanzees had only serologic evidence of infection, including the development of HBsAg and antibody to both the hepatitis B surface and core antigens; in these animals, the incubation periods were prolonged (24 to 25 weeks). In contrast, the other two animals also had elevated levels of SGPT (peaks of 190 and 461 IU/l) and had a more rapid onset. There was no hepatitis B virus infection in two nontransfused controls. The results do not support the use of frozen RBC for the prevention of post-transfusion hepatitis. titis.

6430 PREVENTION OF NEONATAL HEPATITIS B INFECTION BY HIGH-DOSE HEPATITIS B IMMUNE GLOBULIN. (Eng.) Dosik, H.; Jhaveri, R. (Jewish Hosp. and Medical Center of Brooklyn, 555 Prospect Pl., Brooklyn, NY 11238). *N. Engl. J. Med.* 298(11):602-603; 1978.

The cases of two infants and their mother, who was a chronic hepatitis B surface antigen (HBsAg) carrier, are presented. The first child, a boy, developed fatal hepatitis at 3 months of age. Postmortem examination revealed that the child was HBsAg-positive, and the mother was discovered to be an asymptomatic HBsAg carrier. In the second child, a girl, HBsAg and antibody to HBsAg were negative on umbilical cord blood and capillary blood taken 2 hr after birth. She was treated with 5 ml of hepatitis B immune globulin on the day of birth and every 5 weeks for 6 months. HBsAg remained negative, and titers of antibody to HBsAg were consistently above 1:100 during treatment. Eight months after the last dose of hepatitis B immune globulin, the child remained antigen-negative and antibody-positive, with a normal growth pattern. The results in this patient and in many patients in the literature suggest that multi-injection therapy with hepatitis B immune globulin is indicated in infants of HBsAg-carrier mothers.

6431 T LYMPHOCYTE-MEDIATED CYTOTOXICITY IN HBsAg-POSITIVE LIVER DISEASE. (Eng.) El Sheikh, N.; Osman, C. G.; Cullens, H.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London S.E. 5, England). *Clin. Exp. Immunol.* 31(2):158-165; 1978.

Lymphocyte cytotoxicity assays were used to investigate T lymphocyte cytotoxicity in hepatitis B surface antigen (HBsAg)-positive liver disease, using HBsAg-coated RBC as target cells. When lymphocytes from 23 patients with acute hepatitis were tested, cytotoxic T cells were demonstrable during the recovery phase, but not in the first 3 weeks of the illness. However, when these same lymphocytes were extensively washed, cytotoxicity was then detected in all the patients, even at the time of presentation. In patients with HBsAg-positive chronic liver disease, the results with the standard assay were largely within the normal range, but, again, with extensive lymphocyte washing, cytotoxicity was detected in all of the patients with untreated chronic active hepatitis and in five of six with more minor histological lesions. The results in five carriers with normal liver histology were completely different, cytotoxicity remaining undetectable even after the extensive washing pocedure. The results suggest that blocking factors, possibly antigen or antigen-antibody complexes, could be interfering with the detection of sensitized T cells in patients with acute and chronic hepatitis but that there is a true absence of sensitization to HBsAg in healthy carriers with normal liver histology.

6432 HEPATITIS B SURFACE ANTIGEN IN HUMAN TEARS. (Eng.) Darrell, R. W.; Jacob, G. B. (Edward S. Harkness Eye Inst., 635 W. 165th St., New York, NY 10032). *Arch. Ophthalmol.* 96(4):674-676; 1978.

Tears collected from 18 patients with hepatitis B surface antigen (HBsAg)-positive serum and from 15 controls without HBsAg were tested to determine whether the antigen can be transmitted via this blood product. The tears were collected either with a standard Schirmer test-strip or with a soft contact lens. HBsAg was present in 10 of the 18 subjects with serum HBsAg. These results demonstrate that there is a risk of transferring hepatitis B virus infection by tonometers or soft contact lenses contaminated by HBsAg. Infection from body secretions, entry of HBsAg through the conjuctiva, infection among medical personnel, and techniques of reducing hepatitis B virus infection are briefly reviewed.

6433 ANTIBODY TO HEPATITIS B SURFACE ANTIGEN IN HAEMOPHILIACS ON LONG-TERM THERAPY WITH SCOTTISH FACTOR VIII. (Eng.) Burrell, C. J.; Black, S. H.; Ramsay, D. M. (Edinburgh Medical Sch., Edinburgh, Scotland). *J. Clin. Pathol.* 31(4):309-312; 1978.

Thirty-five patients with hemophilia A were studied clinically and serologically in 1971-2 and 1975-6 for evidence of hepatitis B infection to relate the findings to the type and frequency of replacement factor VIII. One patient had clinical hepatitis B, and a further eight patients showed antibody responses to hepatitis B surface antigen (HBsAg) consistent with exposure to HBsAg during this period. No evidence for HBsAg exposure was found in 14 patients, while the remaining 12 patients had high titers of antibody to HBsAg at both times so that no inferences could be drawn about HBsAg exposure. All patients had received exclusively replacement factor VIII material prepared locally from HBsAg-screened voluntary Scottish blood donations. From the details of the therapy given, the rate of HBsAg seroconversion in these patients was calculated to represent about 0.3 HBsAg-containing donations per

1,000 donations. The findings should provide both a guide to the likelihood of seroconversion to anti-HBs positivity after factor VIII replacement from similar defined sources and a basis for comparison of this material with commercial factor VIII preparations.

6434 SUBTYPES OF HBsAg AMONG HEPATITIS PATIENTS. (Eng.) Ukkonen, P. (Dept. Virology, Univ. Helsinki, Helsinki, Finland). *Scand. J. Infect. Dis.* 10(1):11-14; 1978.

Serum samples from 94 Finnish hospital patients with hepatitis B were investigated for subtypes of hepatitis B surface antigen (HBsAg), and these subtypes were correlated with clinical data. The patients were divided into groups according to whether they were drug abusers (31%), had some other increased risk of contracting hepatitis (36%), or had no apparent indication of exposure. There were significant differences between the mean ages of the patients and the clinical form of the disease as well as the subtype of HBsAg. Patients with chronic liver disease or subtype *ad* were older than those with acute hepatitis ($p<0.01$) or subtype *ay* ($p<0.00002$), resp. The drug abusers were the youngest group. Subtype *ay* predominated in patients with acute hepatitis (77%). All drug abusers had the *ay* subtype. Of 11 patients with chronic liver disease, 10 had the *ad* subtype. Five of seven hepatitis cases associated with blood transfusion had subtype *ay*, although this determinant has not been detected among Finnish nonpaid blood donors. These results suggest that blood donors who incubate hepatitis B (HBsAg not yet detectable) are an important source of transfusion hepatitis.

6435 DUALITY OF HEPATITIS B e ANTIGEN IN SERUM OF PERSONS INFECTED WITH HEPATITIS B VIRUS: EVIDENCE FOR THE NONIDENTITY OF e ANTIGEN WITH IMMUNOGLOBULINS. (Eng.) Takahashi, K.; Imai, M.; Miyakawa, Y.; Iwakiri, S.; Mayumi, M. (Jichi Medical Sch., Tochigi-ken 329-04, Japan). *Proc. Natl. Acad. Sci. USA* 75(4):1952-1956; 1978.

Two entitites of hepatitis B e antigen (HBeAg) activity physicochemically different from each other, demonstrated in the sera of persons infected with hepatitis B virus, are described. One was associated with a molecule that precipitated in 1.33 M ammonium sulfate solution, was larger than IgG, had an electrophoretic mobility in the β- to γ-globulin regions, and had an isoelectric point of approximately pH 5.7. In contrast, the other HBeAg activity was associated with a molecule that was soluble in 1.33 M ammonium sulfate solution, was smaller than IgG, and had an electrophoretic mobility in the α-globulin region and an isoelectric point at pH 4.8. In spite of their marked physicochemical differences, a line of antigenic identity was clearly observed for them when they were tested against antibody to HBeAg by a double immunodiffusion method. The HBeAg activity associated with the large molecule was completely removed by an affinity column of anti-IgG, whereas the activity of the small molecule was not. These results indicate that, in the serum, HBeAg exists as a molecule smaller than IgG and also in association with IgG.

6436 HEPATITIS B ANTIGEN--A SURVEY IN A MAJOR METROPOLITAN HOSPITAL. (Eng.) Luey, K. (Bristol Royal Infirmary, Bristol BS2 8HW, England). *Aust. N.Z. J. Med.* 7(4):394-399; 1977.

6437 APPLICATION OF A SCREENING TEST FOR ANTIBODY TO HEPATITIS B CORE ANTIGEN. (Eng.) Cohen, B. J.; Cossart, Y. E. (Central Public Health Lab., Colindale Ave., London NW9 5HT, England). *J. Clin. Pathol.* 30(8):709-713; 1977.

6438 AN ENZYME-LINKED IMMUNOSORBENT-ASSAY TEST FOR HEPATITIS B SURFACE ANTIGEN. (Eng.) Vandervelde, E. M.; Cohen, B. J.; Cossart, Y. E. (Central Public Health Lab., Colindale Ave., London NW9 5HT, England). *J. Clin. Pathol.* 30 (8):714-716; 1977.

6439 BLOOD COAGULATION STUDIES IN PREGNANT PATIENTS WITH INFECTIVE HEPATITIS. (Eng.) Dube, B.; Bhattacharya, S.; Sinha, V. N.; Pandey, L. K.; Dube, R. K. (Inst. Medical Sciences, Banaras Hindu Univ., Varanasi, India). *Br. J. Obstet. Gynecol.* 84(8):592-599; 1977.

See also, 5995, 6329, 6351, 6359, 6362, 6363, 6374, 6379, 6383, 6387, 6397, 6406, 6461, 6462.

LIVER AND BILIARY TRACT

Chronic Hepatitis

6440 CHRONIC HEPATITIS: A PROBLEM FOR THE PATHOLOGIST. (Eng.) Scheuer, P. J. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Histopathology* 1(1):5-19; 1977.

The histological classification of chronic hepatitis is reviewed. The accepted histological categories of chronic hepatitis are chronic persistent hepatitis (CPH) and chronic active or aggressive hepatitis (CAH). A third form, chronic lobular hepatitis (CLH), encompasses those cases in which the lesion is predominantly within the lobules and in

which portal and periportal inflammation are mild. International agreement on a reproducible and rational nomenclature of chronic hepatitis is still far from complete. CPH is characterized by portal inflammation. This category may need subdivision on the basis of immunological studies. CAH should be regarded as a complex rather than a single disease, and it is important to specify the etiology and pathological components in each instance. The concept of CAH must be altered to incorporate the lesion of bridging hepatic necrosis (BHN). Piecemeal necrosis, accompanied by inflammatory infiltration, is considered to be the most important of the various pathogenetic factors in CAH, but BHN probably plays a significant part in accelerating the development of cirrhosis. An excessive portal and periportal inflammatory reaction, with or without BHN, in a liver biopsy taken during the course of an acute hepatitis helps to predict a possible chronic course.

6441 CHRONIC ACTIVE HEPATITIS IN JERUSALEM: COMPARISON BETWEEN HBsAg-NEGATIVE AND HBsAg-POSITIVE CASES. (Eng.) Shouval, D.; Penchas, S.; Sandler, S. G.; Mansour, D.; Eliakim, M. (Hadassah Univ. Hosp., Jerusalem, Israel). *Am. J. Gastroenterol.* 69(1):70-80; 1978.

To establish the etiology and the clinical and laboratory characteristics of chronic active hepatitis (CAH), 43 patients with biopsy proven CAH were studied with special reference to the presence or absence of hepatitis B surface antigen (HBsAg). Evidence of hepatitis B virus (HBV) infection (HBsAg and/or antibody to HBsAg [anti-HBs]) was found in 26 cases. Thus, HBV is probably the most important etiologic factor of CAH in the Jerusalem area. Fifteen patients were HBsAg-positive. This group was characterized by a higher frequency of male patients of Sephardic origin, a relatively frequent acute hepatitis-like onset, early presence of cirrhosis and portal hypertension, and relative rarity of skin rashes, thyroid involvement, and cholelithiasis. L.E. cells, cryoglobulin, paraprotein, and positive Kahn-Wassermannn tests were not found, and antimitochondrial antibodies were less common in this HBsAg-positive group. The mean level of serum albumin was lower while IgG and IgA levels were higher. Mortality was 7% during a mean follow-up period of 4.4 yr. The antigen-negative group was characterized by a higher prevalence of women of Ashkenazic origin, insidious onset, and more frequent presence of skin rashes, thyroid disease, and cholelithiasis. Peripheral lymphomonocytosis, high IgM levels, and antimitochrondrial antibodies were also more common. All cases with L.E. cells (mature neutrophilic polymorphonuclear WBC, which has phagocytized a spherical, homogeneous-appearing inclusion), cryoglobulin, paraproteinemia, and positive Kahn-Wassermann tests were in this gorup. Anti-HBs antibodies were present in 42% of the cases. Mortality was 29% during a mean follow-up period of 5.4 yr. Linear discriminant analysis with 10 variables (sex, mode of onset, skin rash, levels of serum albumin, IgA, and IgM, degree of BSP retention, presence of L.E. cells, antimitochondrial antibodies, and positive Kahn-Wassermann tests) classified correctly 100% of 12 cases that fulfilled the necessary criteria. Sex, ethnic origin (Ashkenazic or other), and presence of thyroid disease classified correctly 85% of 33 cases, thereby permitting a bedside classification with a high degree of credibility.

6442 LYMPHOCYTE CYTOTOXICITY IN CHRONIC ACTIVE HEPATITIS: EFFECT OF THERAPY AND CORRELATIONS WITH CLINICAL AND HISTOLOGICAL CHANGES. (Eng.) Cochrane, A. M. G.; Moussouros, A.; Smith, A.; Portmann, B.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, England). *Gut* 19(4):308-314; 1978.

Lymphocyte cytotoxicity for rabbit hepatocyte cultures was studied in patients with hepatitis B surface antigen (HBsAg)-positive and -negative chronic active hepatitis, before and after immunosuppressive therapy. Before treatment, the cytotoxicity studies in all of 15 patients with HBsAg-positive and -negative hepatitis showed positive results in all cases. After immunosuppressive therapy, cytotoxicity became negative and remained negative, in four of nine patients followed serially. In 51 patients established on therapy for periods from 3 months to 12 yr, cytotoxicity was negative in 19, and all patients are currently alive. However, in the remaining 32 patients in whom cytotoxicity was positive, there have been 11 deaths ($p<0.025$). Cytotoxicity remained persistently positive in 12 of 15 patients followed serially, and persistently negative in 7 of 9. Cytotoxicity showed a significant association with histological disease activity ($p<0.0005$), especially with the extent of piecemeal necrosis ($p<0.01$), but not with biochemical tests of liver function, immunoglobulins, or autoantibodies. The basis of this cytotoxicity test is an antibody-dependent cell-mediated autoimmune reaction directed against a liver specific protein, and the results suggest that in some cases immunosuppressive therapy is followed by control of this reaction. It may be possible to stop therapy in these patients, but in those in whom the reaction continues, as shown by continuing cytotoxicity, the prognosis is not as good, and the use of other drug schedules would seem worthy of trial.

6443 ANTIBODY TO HEPATITIS B CORE ANTIGEN IN CHRONIC ACTIVE HEPATITIS. (Eng.) Bories, P.; Coursaget, P.; Goudeau, A.; Degott, C.; Maupas, P.; Benhamou, J. P. (Hopital Beaujon, 92118 Clichy, France). *Br. Med. J.* 1(6110):396-397; 1978.

Because it has been previously suggested that antibody to hepatitis B core antigen (anti-HBc) may be a more sensitive indicator of hepatitis B virus replication than is hepatitis B surface antigen (HBsAg), studies were carried out to determine whether some patients with HBsAg-negative chronic active hepatitis have anti-HBc in their serum and thus have liver disease that could also be the consequence of hepatitis B virus infection. Anti-HBc was detected in 26 of 65 patients with HBsAg-negative chronic

active hepatitis. All of 35 HBsAg-positive patients had anti-HBc. In the 26 anti-HBc-positive, HBsAg-negative patients, the mean age was 15 yr greater than that in the 35 HBsAg-positive, anti-HBc-positive patients ($p<0.001$), and there was a higher percentage of patients with moderately active liver lesions ($p<0.01$), a greater prevalence of cirrhosis associated with chronic active hepatitis ($p<0.05$), and a lower mean value for SGPT ($p<0.001$) in the former group. The results could indicate that the liver disease in the HBsAg-negative patients is the consequence of chronic infection with hepatitis B virus or that the two groups represent either two stages of chronic infection with hepatitis B virus or two types of response to it.

6444 CHRONIC ACTIVE HEPATITIS, HAEMOLYTIC ANAEMIA AND Listeria monocytogenes BACTERAEMIA. (Eng.) Chadwick, R. G.; Graham, J. M. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Postgrad. Med. J.* 54(627):55-57; 1978.

The case of a patient with transient *Listeria monocytogenes* bacteremia and hemolytic anemia associated with chronic active hepatitis is presented. The patient, a 53-yr-old woman, presented with a 3-week history of jaundice, dark urine, and pale feces. She had been breathless on exertion and tired for 1 week. The patient was treated with prednisolone (30 mg, reducing to 20 mg/day) for 17 months. The hemolytic anemia responded completely, and the serum proteins and liver function tests returned to normal. Eight weeks after prednisolone was stopped, the patient presented with a 10-day history of worsening obstructive jaundice, anorexia, night sweats, and fever. A liver biopsy showed established cirrhosis. Blood cultures produced a growth of *L. monocytogenes* type 1/2, but by the time the organism had been isolated the fever had settled without antibiotics, and repeat blood cultures were negative. This patient appears to be exceptional in having recovered spontaneously from this type of bacteremia.

6445 HYPERVISCOSITY SYNDROME ATTRIBUTABLE TO HYPERGLOBULINEMIA IN CHRONIC ACTIVE HEPATITIS. (Eng.) Lee, W. M.; Lebwohl, O.; Chien, S. (161 Fort Washington Ave., New York, NY 10032). *Gastroenterology* 74(5, Part 1):918-921; 1978.

The case of an 18-yr-old woman with clinical and histological features of chronic active hepatitis who was noted to have extremely high levels of immunoglobulin (14.6 g/dl) is presented. The hyperglobulinemia was associated with the hyperviscosity syndrome, diffuse coagulation abnormalities, and renal insufficiency in the absence of severe liver disease. Correction of these features occurred with plasmapheresis before corticosteroid therapy was begun. A similar group of persons with very high γ-globulin levels, described previously under the heading of "plasma cell hepatitis," may form a distinct and rare subgroup of chronic active hepatitis patients.

6446 LYMPHOCYTE SUBPOPULATIONS IN CHRONIC LIVER DISEASE. (Eng.) McFarlane, I. G.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London SE5, England). *Clin. Exp. Immunol.* 30(1):1-3; 1977.

See also, 6351, 6353, 6358, 6362, 6370, 6383, 6406, 6425, 6431, 6448, 6524.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

6447 LIVER SIZE AND INDICES OF DRUG METABOLISM IN ALCOHOLICS. (Eng.) Pirttiaho, H. I.; Sotaniemi, E. A.; Ahlqvist, J.; Pitkanen, U.; Pelkonen, R. O. (Dept. Internal Medicine, Univ. Oulu, SF-90220 Oulu 22, Finland). *Eur. J. Clin. Pharmacol.* 13(1):61-67; 1978.

The role of liver size in drug metabolism was investigated in 34 chronic alcoholics and 28 controls by comparing antipyrine half-life with biopsy content, total amount of hepatic cytochrome P-450 (P-450), and liver weight. Liver weight was significantly greater in alcoholics than in controls in terms of both absolute liver weight (g; $p<0.001$ in cirrhosis and alcoholic hepatitis, $p<0.005$ in fatty liver) and in terms of relative weight (g/kg; $p<0.001$ in cirrhosis, $p<0.005$ in alcoholic hepatitis, $p<0.01$ in fatty liver). Alcoholics with normal histology also had heavier livers ($p<0.005$). Total P-450 was increased and antipyrine half-life was enhanced in alcoholics with normal liver histology (28.11×10^3 nmol and 6.7 hr, resp., $p<0.05$ in both cases). In subjects with alcoholic hepatitis or cirrhosis, the antipyrine half-life was prolonged ($p<0.001$) and P-450 was decreased ($p<0.01$ and $p<0.05$, resp., for hepatitis and cirrhosis; $p<0.001$ in both cases when P-450 was expressed as nmol/g). Alcoholics with fatty liver had a reduced P-450 content, but the total amount of P-450 and the antipyrine half-life were normal. The results demonstrate, in alcoholics, that an enlarged liver of normal histological appearance is associated with enhanced drug metabolism. In subjects with fatty liver, the drug metabolizing capacity per unit weight of liver is

often impaired, but the increase in liver size leads to undisturbed total oxidizing capacity and normal *in vivo* metabolism. In alcoholic hepatitis, drug metabolism is impaired in spite of hepatomegaly. In cirrhosis, the enlargement of the liver appears to compensate for the decreased P-450 content, resulting in only slightly decreased total P-450, and the severely impaired *in vivo* drug metabolism may be due to derangement of blood flow.

6448 INFLUENCE OF STEROIDS ON UREA-CYCLE ENZYMES IN CHRONIC HUMAN LIVER DISEASE. (Eng.) Maier, K. P.; Talke, H.; Heimsoeth, H.; Gerok, W. (Medizinische Universitats-Klinik, Hugstetter Str. 55, D-7800 Freiburg, W. Germany). *Klin. Wochenschr.* 56(6):291-295; 1978.

To determine the effects of steroids on urea cycle enzymes in liver disease, the activities of Krebs-Henseleit enzymes were determined in liver biopsies of normal controls and of patients with alcoholic hepatitis and chronic active hepatitis after prednisone administration. Prednisone was administered for 5 days in decreasing doses (1.5 mg-0.5 mg/kg) to both patients with alcoholic hepatitis and controls. Patients with chronic active hepatitis received 15-20 mg prednisone daily for more than 3 months. In controls prednisone did not influence the activities of Krebs-Henseleit enzymes. In patients with alcoholic hepatitis, most of the urea-cycle enzymes were significantly decreased in activity ($p<0.05$) before treatment when compared with those in controls. After glucocorticoid administration, the enzyme activities remained unchanged. The activities of most of the urea cycle enzymes were significantly ($p<0.05$) decreased in untreated patients with chronic active hepatitis. In some patients, glucocorticoid administration was associated with clinical, biochemical, and histological remission. The activities of the rate-limiting enzymes of the urea cycle, arginosuccinate synthetase and carbamylphosphate synthetase, increased significantly ($p<0.05$) in these patients. By contrast, alterations of enzyme activities were not observed in patients who failed to respond favorably to steroid treatment. The increase in most urea cycle enzymes in patients with successfully treated chronic active hepatitis would indicate a restored capacity of the liver to synthesize urea.

6449 PATHOGENESIS AND EARLY DIAGNOSIS OF ALCOHOLIC LIVER INJURY. (Eng.) Lieber, C. S. (Veterans Admin. Hosp., Bronx, NY). *N. Engl. J. Med.* 298(16):888-893; 1978.

The pathogenesis of alcoholic liver injury and its early detection are discussed. Experiments with baboons have indicated that cirrhosis can develop after high alcohol consumption even when the diet is adequate, suggesting that alcohol itself, rather than the malnutrition associated with alcoholism, is a cause of liver injury. A test comparing the level of alpha-amino-n-butyric acid, which is elevated in the plasma of alcoholics, to that of leucine and concurrently measuring γ-glutamyltranspeptidase has been useful in detecting active alcoholism. Liver injury occurs and progresses because of the deleterious effects of intracellular protein accumulation, elevated blood acetaldehyde levels, microsomal activation of hepatotoxins, alterations in redox state, and lymphocyte cytotoxicity. The activity of serum glutamic dehydrogenase correlates much better with the degree of liver necrosis and inflammation than does the activity of serum transaminases or γ-glutamyltranspeptidase, probably because of its much higher content in the liver and its selective localization. The presence of pericentral sclerosis at the fatty liver stage is an indication that the patient is likely to develop cirrhosis. Changes in collagen metabolism also appear to be important in the development of cirrhosis, and agents that interfere with collagen production or secretion may prove to be helpful in alcoholic patients.

6450 ACUTE CHOLESTASIS, HEPATIC FAILURE, AND FATTY LIVER IN THE ALCOHOLIC. (Eng.) Morgan, M. Y.; Sherlock, S.; Scheuer, P. J. (Royal Free Hosp., Pond St., Hampstead, London, England). *Scand. J. Gastroenterol.* 13(3):299-303; 1978.

Case reports are presented for three alcoholics, two of whom died, who presented with acute cholestasis and hepatic failure and who showed predominantly fatty change on liver biopsy. Each patient had drunk 100-375 g ethanol/day for 12-20 yr. All had neglected their diet for 6 months prior to admission. Liver tests showed values of >50 μM for serum bilirubin, suggesting cholestasis, and at least 30 King-Armstrong U/dl for serum alkaline phosphatase activity; aspartate transaminase values were elevated, indicating hepatocellular damage. Presenting symptoms such as malaise, anorexia, hepatomegaly, leukocytosis, and cholestasis indicated that the patients were suffering from acute alcoholic hepatitis, however, the classical histological elements of this disease such as centrilobular liver cell swelling, Mallory bodies, focal infiltration by neutrophils, and pericellular fibrosis were not observed. Histological features (at biopsy or autopsy) were similar in all three patients. There was severe fatty change with cholestasis; many centrizonal liver cells contained fine vacuoles in addition to larger fat droplets; portal tracts were enlarged and contained inflammatory cells and proliferated bile ducts; fibrosis extended from the portal tracts into the lobules to a variable extent.

6451 VITAMIN-A REVERSAL OF ABNORMAL DARK ADAPTATION IN CIRRHOSIS: STUDY OF EFFECTS ON THE PLASMA RETINOL TRANSPORT SYSTEM. (Eng.) Russell, R. M.; Morrison, S. A.; Smith, F. R.; Oaks, E. V.; Carney, E. A. (Veterans Admin. Hosp., 3900 Loch Raven Blvd., Baltimore, MD 21218). *Ann. Intern. Med.* 88(5):622-626; 1978.

Studies were carried out to investigate to what extent abnormalities of dark adaptation are associated with abnormalities in plasma retinol transport and whether the supplemental vitamin A-associated reversal of dark adaptation abnormalities is media-

ted by its effects on the plasma retinol transport system. Of 26 patients hospitalized with mild to moderate alcohol-associated cirrhosis, 14 had dark-adaptation abnormalities consistent with marginal vitamin A status. The response of dark adaptation and the plasma retinol transport proteins, retinol-binding protein and prealbumin, was studied in 12 of these patients after daily p.o. vitamin A supplements (3,300 μg/day). Vitamin A supplementation was associated with significant ($p<0.05$-0.005) improvement in dark adaptation and increased plasma concentrations of retinyl esters ($p<0.005$), retinol ($p<0.005$), and retinol-binding protein ($p<0.05$). Thus, in patients with cirrhosis and marginal vitamin A status, supplemental vitamin A therapy appears to stimulate retinol-binding protein release from the liver. This enhancement of plasma retinol transport and delivery of retinol to peripheral tissues such as the retina is one of several factors that may serve to optimize vitamin A nutritional status in patients with cirrhosis.

6452 EFFECTIVE 25-HYDROXYLATION OF VITAMIN D_2 IN ALCOHOLIC CIRRHOSIS. (Eng.) Posner, D. B.; Russell, R. M.; Absood, S.; Connor, T. B.; Davis, C.; Martin, L.; *et al.* (Veterans Admin. Hosp., 3900 Loch Raven Blvd., Baltimore, MD 21218). *Gastroenterology* 74(5, Part 1):866-870; 1978.

Because metabolic bone disease is commonly seen in alcoholism and cirrhosis, the prevalence of low serum 25-hydroxy vitamin D (25-OH-D) levels and reduced bone density were studied in severe, stable alcoholic cirrhosis. Studies were carried out to determine whether any correlation exists between low serum 25-OH-D levels and reduced bone mineral content as measured by bone density of the distal radius. The responses of serum 25-OH-D, calcium, phosphorus, serum immunoreactive parathyroid hormone (IPTH), and bone density to long term vitamin D_2 treatment were also investigated. Thirty-two patients were studied, and low serum 25-OH-D was found in 14. Among 23 of the 32, the mean bone density of the distal radius was below that of normal age and sex-matched Baltimore men, although the reduction in bone density did not correlate with serum levels of 25-OH-D. Thirteen patients with low serum 25-OH-D levels (i.e., <20 ng/ml) were treated with p.o. vitamin D_2, which raised their serum 25-OH-D from a mean baseline value of 7 ± 1 ng/ml to 116 ± 1 ng/ml within 1 month. Normal or supranormal levels of 25-OH-D then persisted throughout the 3- to 6-month treatment period. Mean bone density fell after 3 months of treatment ($p<0.01$), but in those who completed 6 months, it rose back to pretreatment levels. During vitamin D therapy, serum calcium rose ($p<0.05$), and serum phosphorus fell ($p<0.05$). Mean serum parathyroid hormone levels did not change significantly at any time during treatment. This study demonstrates that patients with severe, advanced alcoholic cirrhosis are capable of forming 25-OH-D in amounts sufficient to result in metabolic activity in bone. Low serum levels of 25-OH-D in alcoholic cirrhotics cannot be explained only by defective 25-hydroxylation of vitamin D.

6453 NONALCOHOLIC FATTY LIVER WITH ALCOHOLIC HYALIN AFTER LONG-TERM GLUCOCORTICOID THERAPY. (Eng.) Itoh, S.; Igarashi, M.; Tsukada, Y.; Ichinoe, A. (Chiba Univ. Sch. Medicine, 1-8-1 Inohana, Chiba, Japan). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):415-418; 1977.

The case of a 34-yr-old nonalcoholic woman in whom alcoholic hyalin was found in the liver after long-term glucocorticoid therapy for systemic lupus erythematosus is presented. Hepatocytes including hyalin bodies showed fatty change or vesiculated degeneration. Occasionally, a basophilic substance, which was recognized in the hepatocytes with or without hyalin, was noticed showing features similar to delicate alcoholic hyalin. Alcoholic hyalin occurring in a case of fatty liver following glucocorticoid therapy has not been previously described.

6454 ALCOHOLIC HEPATITIS. (Eng.) Sabesin, S. M.; Hawkins, H. L.; Bertram, P. D.; Mann, J. A.; Peace, R. J. (Univ. Tennessee Center for Health Sciences, 951 Court Ave., Memphis, TN 38163). *Gastroenterology* 74(2):276-286; 1978.

Three case histories are presented to illustrate various clinical and pathological manifestations of acute alcoholic hepatitis, and other aspects of the disease are reviewed. A 32-yr-old man, who was hospitalized four times during a 3.5-yr period and continued to drink heavily between hospitalizations, developed in succession biopsy-proven fatty liver, alcoholic hepatitis, cirrhosis, and hepatocellular necrosis and died from aspiration during an upper gastrointestinal hemorrhage. A 31-yr-old woman was hospitalized with a 3-week history of heavy alcohol consumption and a history of chronic alcoholism. Three complications occurred: daily fever for 1 month, attributed to ongoing hepatocellular necrosis; marked sustained hyperbilirubinemia associated with elevated alkaline phosphatase; and ascites and minimal hypertransaminasemia. This case demonstrates that intense and prolonged cholestasis may occur in acute alcoholic hepatitis and may simulate extrahepatic biliary obstruction. A 40-yr-old man with both chronic and acute alcoholic liver disease died from fulminant hepatic failure on the 7th day of hospitalization. Alcoholic hepatitis and its progression to cirrhosis may be mediated by immune mechanisms. It has been proposed that once hepatotoxicity has been initiated, injury may be perpetuated by the cytotoxic lymphokines elaborated by T-lymphocytes after exposure to alcoholic hyaline or acetaldehyde. Patients with alcoholic hepatitis have characteristic abnormalities in plasma lipoprotein electrophoretic patterns. Severe alcoholic hepatitis with encephalopathy may be helped by high doses of corticosteroids and drugs that inhibit collagen biosynthesis or secretion may help prevent cirrhosis.

6455 DEPRESSED DELAYED CUTANEOUS HYPERSENSITIVITY IN ALCOHOLIC HEPATITIS. (Eng.) Snyder, N.; Bessoff, J.; Dwyer, J. M.; Conn, H.

O. (Univ. Texas Medical Branch, Galveston, TX 77550). *Am. J. Dig. Dis.* 23(4):353-358; 1978.

Because a negative response to intermediate purified protein derivative (PPD) antigen has been observed in alcoholic hepatitis, delayed cutaneous hypersensitivity was studied in 10 patients with severe alcoholic hepatitis, 9 patients with either inactive alcoholic cirrhosis or alcoholic fatty liver, and 10 age-matched controls. The mean response of the alcoholic hepatitis group was significantly less compared with controls for streptokinase-streptodronase (SK-SD, $p<0.001$), mumps ($p<0.001$), trichophyton ($p<0.025$), and *Candida albicans* ($p<0.025$) antigens. Upon clinical recovery, the response of the six surviving patients with alcoholic hepatitis was similar to controls for four of the five antigens tested, and the improvements in response to SK-SD and *Candida albicans* were significant ($p<0.02$ and $p<0.05$, resp.). The mean percentage and absolute numbers of thymus-derived lymphocytes were significantly less in the alcoholic hepatitis group compared with controls ($p<0.05$ and $p<0.025$, resp.). Both the alcoholic hepatitis patients and patients with less advanced alcoholic liver disease had a diminished response to concanavalin A and phytohemagglutinin. This study demonstrates a reversible depression of delayed cutaneous hypersensitivity in alcoholic hepatitis. The authors recommend that skin tests in patients with alcoholic hepatitis be interpreted with this phenomenon in mind.

6456 HEPATIC STEATOSIS IN CHILDREN. (Eng.) Colon, A. R. (Georgetown Univ. Sch. Medicine, Washington, DC). *Am. J. Gastroenterol.* 68(3):260-269; 1977.

Hepatic steatosis in children is reviewed. Childhood hepatic steatosis is a common and generally benign condition that occurs in many pathophysiologic states and is rapidly reversible with correction of the abnormal metabolic state that induced it. The most thoroughly explored pathway of steatosis has been fatty infiltration secondary to ethanol. Another pathway involves decreased apoprotein synthesis. Lipolysis of adipose tissue triglyceride or hydrolysis of lipoprotein and chylomicron triglyceride by extrahepatic lipases can result in hepatic fatty infiltration as can abnormal hormonal states and various nutritional deficiencies. Childhood hepatic steatosis has a variety of causes, including toxic, nutritional, metabolic, inflammatory, and storage factors. Toxic causes include aflatoxin, amanitatoxin, ethanol, and poisoning with carbon tetrachloride, arsenic, lead, diethylene glycol, phosphorus, chloroform, and vitamin A. Intestinal by-pass procedures, cystic fibrosis, and kwashiorkor can all produce steatosis as can several nutritional deficiencies. Metabolic causes include galactosemia, the glycogenoses, hyperlipoproteinemia, and several familial metabolic syndromes. Among the inflammatory causes are chronic bowel diseases, and sepsis. Storage abnormalities implicated in steatosis include α-1-antitrypsin deficiency, histiocytosis, and the gangliosidoses. Treatment involves the removal of the responsible toxin, bacterium, or drug, dietary control, or nutritional replacement therapy.

6457 ALCOHOLIC HEPATITIS WITH AND WITHOUT ALCOHOLIC HYALINE. (Eng.) Nakamura, S.; Takezawa, Y.; Sato, T.; Aikawa, T.; Kera, K. (Tohoku Univ. Health Center, Sendai 980, Japan). *Tohoku J. Exp. Med.* 123(4):351-358; 1977.

6458 CONTINUOUS LOW DOSE PERIPHERAL VEIN PITRESSIN INFUSION IN THE CONTROL OF VARICEAL BLEEDING. (Eng.) Rigberg, L. A.; Ufberg, M. H.; Brooks, C. M. (Memorial Hosp., Phoenix, AZ). *Am. J. Gastroenterol.* 68(5):481-484; 1977.

See also, 6244, 6326, 6358, 6359, 6397, 6406, 6446, 6462.

LIVER AND BILIARY TRACT

Cirrhosis

6459 ALVEOLAR-CAPILLARY OXYGEN DISEQUILIBRIUM IN HEPATIC CIRRHOSIS. (Eng.) Davis, H. H., II; Schwartz, D. J.; Lefrak, S. S.; Susman, N.; Schainker, B. A. (Jewish Hosp. of St. Louis, 216 S. Kingshighway, St. Louis, MO 63110). *Chest* 73 (4):507-511; 1978.

Physiological and pathologic studies were carried out in a 35-yr-old man with cyanosis, clubbing, and cirrhosis to investigate the mechanism for the hypoxemia observed frequently in severe hepatic disease. Pulmonary function was normal except for a low diffusing capacity and a 28% shunt while the patient was breathing 100% oxygen. A perfusion scan with radioactive ^{99m}technetium-labeled macroaggregated albumin revealed 67% of the labeled macroaggregated albumin in the systemic circulation. Postmortem examination demonstrated normal pulmonary parenchyma, markedly dilated intraparenchymal capillaries and arterioles, subpleural angiomata, and

cirrhosis. No anatomic arteriovenous connections were demonstrated before or after death. It is concluded that the arterial hypoxemia of some patients with hepatic cirrhosis results from dilated gas-exchanging blood vessels. These widened vessels prevent end pulmonary capillary oxygen tension from reaching equilibrium with alveolar gas, perhaps because of the widened distance for diffusion.

6460 ABNORMAL LIPOPROTEINS IN A CASE OF PRIMARY BILIARY CIRRHOSIS. (Eng.) Etienne, J.; Beucler, I.; Ayrault, M.; Cloarec, M.; Polonovski, J.; Debray, J. (Laboratoire de Biochimie et Clinique medicale A, CHU Saint-Antoine, Paris, France). *Biomedicine [Express]* 29(1):33-37; 1978.

The serum lipoproteins of a patient with primary biliary cirrhosis were studied during the various evolutive stages of the disease. During the preicteric period, the serum lipoprotein had the chemical composition of that found in cholestasis (rich in cholesterol and phospholipids); however, the serum bilirubin level was normal, and no lipoprotein X (LPX) was detected; there was a normal esterified to total cholesterol ratio and the α lipoprotein had not decreased, as expected, but increased and was divided into two fractions; immunoelectrophoretic studies of ultracentrifugal fractions showed some lipoprotein with high-density lipoprotein (HDL) immunological properties, but with lower densities than those of normal HDL. The authors suggest that the phospholipid overloading of some of these HDL in the patient's serum could explain the changes in density. During the icteric period, the patient's serum exhibited characteristics of cholestasis, with disappearance of HDL and the appearance of LPX. During the subsequent period, the serum again contained phospholipid rich HDL and LPX. Several LPX with different densities were found. It seems that, in cholestasis, lipoproteins undergo modification in which the HDL peptide chains play an important role.

6461 FAMILIAL CLUSTERING AND IMMUNE RESPONSE IN FAMILY CONTACTS OF PATIENTS WITH HBsAg-POSITIVE LIVER CIRRHOSIS. (Eng.) Eliakim, M.; Ligumski, M.; Sandler, S. G.; Zlotnick, A. (Hadassah Univ. Hosp., P.O. Box 499, Jerusalem, Israel). *Am. J. Dig. Dis.* 23(5):407-412; 1978.

Families of 11 patients with hepatitis B surface antigen (HBsAg)-positive cirrhosis were studied to evaluate the immunologic correlates and extent of intrafamilial HBsAg clustering. Of 76 family contacts, 12 were identified to be asymptomatic carriers of HBsAg and 2 were diagnosed as having HBsAg-positive cirrhosis. The overall HBsAg prevalence for the 76 contacts was 18% and that for all 87 members studied was 29.0%. Serologic evidence of hepatitis B virus (HBV) infection (either HBsAg, anti-HBs, or both) was detected in 59% of all family members. HBsAg was more prevalent in men (47%) compared with women (16%), whereas antibody to HBs (anti-HBs) was more prevalent in women (42%) compared with men (18%). Evidence of an immunologic response in clinically unaffected HBsAg-negative family contacts consisted of elevated serum IgG levels (mean 1,660 mg/100 ml) and increased prevalence of antismooth muscle and antimitochondrial antibodies (16% and 6%, resp.). The prevalence of one or more autoantibodies in all HBsAg-negative family contacts was 20%, and it was higher in women (25%) than in men (13%). This study demonstrates that HBsAg clustering occurs in families of cirrhotic patients in the Jerusalem area and indicates that HBsAg-negative family contacts may have increased B-cell activity.

6462 ELECTRONEUROGRAPHIC EVIDENCE OF POLYNEUROPATHY IN CHRONIC LIVER DISEASE. (Eng.) Vasilescu, C.; Florescu, A.; Balta, N. (Inst. Neurology and Psychiatry, Sos. Berceni 10--12, C.P. 5880, R-75622 Bucharest, Rumania). *Arch. Psychiatr. Nervenkr.* 225(1):87-96; 1978.

An electroneurographic study of the peripheral nerves was carried out in 25 patients with severe cirrhosis following viral hepatitis to determine whether this type of study would be of value in the early diagnosis of peripheral neuropathy in cirrhosis. There was a slight slowing ($p>0.05$) of motor conduction velocity (CV) and a significant diminution ($p<0.001$) of sensory CV and mixed sensorimotor-evoked potentials, associated with a significant decrease in the amplitude of sensory evoked potentials. The slowing was about equal in the distal (digital) and in the proximal segments of the same nerve. A mixed axonal degeneration and segmental demyelination may explain these findings. The CV measurements proved helpful for an early diagnosis of hepatic polyneuropathy showing subjective symptoms in the subclinical stage.

6463 SPECTRUM OF RENAL TUBULAR DAMAGE IN RENAL FAILURE SECONDARY TO CIRRHOSIS AND FULMINANT HEPATIC FAILURE. (Eng.) Wilkinson, S. P.; Hirst, D.; Day, D. W.; Williams, R. (King's Coll. Hosp. and Medical Sch., London SE5, England). *J. Clin. Pathol.* 31(2):101-107; 1978.

Measurements of urinary lysozyme were used to evaluate renal tubular integrity in 34 patients with cirrhosis or fulminant hepatic failure who had developed renal impairment, and the results were compared with the histological findings and the laboratory tests usually used in the differentiation of functional renal failure from acute tubular necrosis. In 18 of the patients, the lysozyme fractional clearance values were normal (<1%) but in the remaining 16 were increased (ranging up to 78%), supporting previous concepts that renal failure complicating hepatocellular disease may occur both without and with tubular necrosis. The lysozyme values were inversely related to the creatinine clearance (14/15 patients with creatinine/clearance of ≥3 ml/ml had normal lysozyme values, whereas 15/19 with creatinine clearance of <3 ml/min had elevated lysozyme values), suggesting that the development of tubular necrosis may be determined by the level of renal perfusion. The validity of simpler laboratory tests often used to assess renal tubular integrity--namely, the urine sodium concentration, the urine:plasma

osmolality ratio, and casts in the urine sediment--was evaluated by comparison with the lysozyme measurements. The urine sodium concentration was of most value (patients with normal lysozyme levels always had <12 mM Na in the urine, but patients with elevated lysozyme levels (with one exception) always had high Na levels, with a maximum of 110 mM) and the findings in the sediment were of no value at all.

6464 RHEUMATIC DISORDERS IN PRIMARY BILIARY CIRRHOSIS. (Eng.) Clarke, A. K.; Galbraith, R. M.; Hamilton, E. B. D.; Williams, R. (Royal Natl. Hosp. Rheumatic Diseases, Upper Borough Walls, Bath BA1 1RL, England). *Ann. Rheum. Dis.* 37(1):42-47; 1978.

Eighty-three patients with primary biliary cirrhosis were investigated to determine the prevalence of rheumatic disorders. Fourteen patients had scleroderma, which tended to be mild, but in several patients it produced severe systemic manifestations. Keratoconjunctivitis sicca occurred in all but one of the patients with scleroderma. The CRST syndrome (calcinosis, Raynaud's phenomenon, sclerodactyly, telangiectasia) was only identified twice. There was an increased incidence of histocompatibility locus antigens A1+B8 in those patients with scleroderma (10/14), compared with that in 89 healthy controls (17%, $p<0.01$). In addition to those with scleroderma, four patients had a destructive arthropathy resembling avascular necrosis. Four patients had an inflammatory arthritis, without specific features, but the frequency was no greater than might be expected in the general population. Both keratoconjunctivitis sicca and scleroderma complicating biliary cirrhosis may be due to an immune response.

6465 INCORPORATION OF RADIOCOPPER INTO CERULOPLASMIN IN NORMAL SUBJECTS AND IN PATIENTS WITH PRIMARY BILIARY CIRRHOSIS AND WILSON'S DISEASE. (Eng.) Vierling, J. M.; Schrager, R.; Rumble, W. F.; Aamodt, R.; Berman, M. D.; Jones, E. A. (Liver Unit, Building 10, Room 4D-52, NIH, Bethesda, MD 20014). *Gastroenterology* 74(4):652-660; 1978.

To investigate whether measurements of the incorporation of radiocopper into ceruloplasmin are of value in distinguishing between different diseases associated with accumulation of copper in the tissues, the kinetics of the incorporation of i.v. or p.o. administered radiocopper into ceruloplasmin were studied in eight normal subjects and in eight patients with hepatic copper overload states (6 with primary biliary cirrhosis and 2 with Wilson's disease). After 0.8 days, the radiocopper content of ceruloplasmin in serum was negligible in the patients with Wilson's disease, whereas it was appreciable in the remaining subjects. Total incorporation of radiocopper into ceruloplasmin was calculated by deconvoluting plasma curves of radiocopper in ceruloplasmin with the plasma disappearance curve of i.v. administered radioiodinated ceruloplasmin, and integrating the derived function. In normal subjects, incorporation of radiocopper into ceruloplasmin was reduced by approximately 50% when the isotope was given p.o. rather than i.v. Plots of the curves of total incorporation of radiocopper into ceruloplasmin against time revealed components that were approximately linear between 2 and 7 days. Extrapolation of these components to zero time yielded positive intercepts with the ordinate, which were relatively smaller in the patients with primary biliary cirrhosis than in the normal subjects. It is concluded that: (1) measurements of incorporation of radiocopper into ceruloplasmin can be used to distinguish between two hepatic copper overload states; (2) approximately 50% of p.o. administered radiocopper is not absorbed; (3) copper is incorporated into ceruloplasmin by at least two different pathways, a slower route that probably involves initial equilibration with a hepatic storage pool, and a more rapid route that presumably bypasses this pool; and (4) incorporation of radiocopper into ceruloplasmin via the more rapid pathway is impaired in primary biliary cirrhosis.

6466 NEOMYCIN-SORBITOL AND LACTULOSE IN THE TREATMENT OF ACUTE PORTAL-SYSTEMIC ENCEPHALOPATHY: A CONTROLLED, DOUBLE-BLIND CLINICAL TRIAL. (Eng.) Atterbury, C. E.; Maddrey, W. C.; Conn, H. O. (Veterans Admin. Hosp., West Spring St., West Haven, CT 06516). *Am. J. Dig. Dis.* 23(5):398-406; 1978.

In a double-blind, randomized study, the efficacy of lactulose was compared with that of Neomycin-sorbitol in the treatment of 45 episodes of acute nitrogenous portal systemic encephalopathy (PSE) induced by dietary protein, azotemia, or gastrointestinal hemorrhage. All 35 patients had underlying cirrhosis and, at the time of randomization, had encephalopathy of at least grade 2 severity and arterial ammonia concentrations greater than 150 µg/100 ml. Two-thirds of the patients in each group returned to normal mental status, and more than 80% in each group showed an improvement of at least one grade in mental state. In addition, there was equivalent improvement in asterixis, in the performance of the Number Connection Test, in the electroencephalographic pattern, and in arterial ammonia concentration. The principal difference between the two groups was a greater reduction in stool pH after lactulose therapy (from 7.0 to 5.5 after therapy, $p<0.001$) than after neomycin-sorbitol therapy (from 7.0 to 6.5, $p<0.01$). One patient randomized to neomycin-sorbitol had to be withdrawn from the study because of persistent vomiting related to the administration of the medication. Otherwise, there were no complications attributable to therapy in either group. These data suggest that neomycin-sorbitol and lactulose are equally effective in the treatment of acute nitrogenous portal systemic encephalopathy.

6467 PORTAL HYPERTENSION. (Eng.) McDermott, W. V., Jr. (New England Deaconess Hosp.,

Boston, MA 02215). *Surg. Clin. North Am.* 57(2): 375-396; 1977.

6468 THE MANAGEMENT OF PORTAL HYPERTENSION AND BLEEDING OESOPHAGEAL VARICES. (Eng.)

Shields, R. (Royal Infirmary, Liverpool, England). *J. Appl. Med.* 3(8):821-830; 1977.

See also, 6003, 6351, 6353, 6358, 6359, 6369, 6394, 6397, 6400, 6401, 6404, 6406, 6446, 6544, 6553.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

6469 EFFECT OF IOGLYCAMIDE (BILIGRAM) ON BILE FLOW AND BILIARY LIPID SECRETION IN MAN. (Eng.) Bell, G. D.; Doran, J.; Fayadh, M.; Murphy, G.; Dowling, R. H. (City Hosp., Nottingham, England). *Gut* 19(4):300-307; 1978.

The effect of ioglycamide on bile flow and biliary lipid output was studied in man. Twenty-one anicteric patients with a t-tube *in situ* were studied between the 9th and 11th postoperative days; 11 patients were given an i.v. infusion of ioglycamide (2 mg/kg/min for 2 hr in 5 patients and 4 mg/kg/min for 1 hr plus 1 mg/kg/min for 30 min in 6 patients), and the other 10 acted as controls. Bile flow was recorded, and the biliary concentrations of ioglycamide, bile salt, phospholipid, and cholesterol were estimated in the two groups. The biliary excretion of ioglycamide was associated with a significant choleresis ($p<0.001$ or $p<0.01$), which was probably due to the obligatory coupling of the osmotically active contrast agent molecules with water. Biliary ioglycamide excretion did not significantly alter bile salt secretion rates. In contrast, the biliary secretion of both phospholipid and cholesterol was significantly lowered ($p<0.001$). Unlike chenodeoxycholic acid, ioglycamide significantly reduced bile acid independent cholesterol secretion ($p<0.01$), although secretion rate in terms of micromoles of cholesterol per micromoles of bile acid was essentially unchanged. These studies show that the biliary excretion of ioglycamide is associated with a significant choleresis that is independent of bile salt secretion. The authors conclude that ioglycamide might prove to be a prototype for the future development of an orally-administered drug for dissolving cholesterol gallstones.

6470 VALUE OF THE CHIBA NEEDLE IN THE TECHNIQUE OF PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY: A REPORT OF 20 CASES. (Fre.) Grenier, P.; Girault, M. J.; Brault, B.; Nahum, H. (Hopital Beaujon, 100, boulevard du General Leclerc, F 92110 Clichy, France). *J. Radiol. Electrol. Med. Nucl.* 58(10):659-663; 1977.

The Chiba needle, much finer and more flexible than conventional ones, was used for percutaneous transhepatic cholangiography in 20 patients with cholestasis. Opacification of the biliary canals was possible in 15/16 patients with dilated bile ducts and in 4/4 patients with undilated ducts. In seven cases, incomplete opacification occurred, especially of canals on the left side (the puncture usually centers on the right side of the liver); the gallbladder was badly opacified in seven cases and there was no duodenal passage in four cases. It appears more difficult to aspirate bile during this procedure than with the use of larger diameter needles, which accounts for the problems of opacification. There were nine intraparenchymatous injections (which interfered with the examination twice), four subcapsular injections, and a periportal injection which necessitated interruption of the procedure. No infectious complications occurred (the risk of biliary peritonitis is only 0.64%). Surgery is not imperative after this technique and may be deferred if necessary. The success in catheterizing undilated biliary canals makes this a valuable procedure in cases of prolonged hepatitis or anicteric cholestasis.

6471 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY AND NEEDLE BIOPSY IN THE DIFFERENTIAL DIAGNOSIS OF OBSTRUCTION OF BILE FLOW. (Eng.) Wessely, Z.; Chawla, S. K.; Klavins, J. V. (Queens Hosp. Center, 82-68 164th St., Jamaica, NY 11432). *Am. J. Gastroenterol.* 68(6):582-594; 1977.

Twenty-four patients with clinical evidence of obstructive jaundice were examined by percutaneous transhepatic cholangiography (PTC) and needle biopsy (NB) of the liver to evaluate the combined application of these techniques in the diagnosis of liver diseases. The presence of extrahepatic bile duct obstruction was confirmed by surgery in 21 cases. PTC and the combination of both methods were superior to NB alone in the differential diagnosis between extra- and intra-hepatic biliary obstruction. Sampling bias added to the difficulties of NB in distinguishing between these two types of obstruction. The combination of both procedures proved most useful in three cases with intrahepatic obstruction, in which the patients were spared unnecessary surgery. In five cases, the NB provided additional information about the nature of the tu-

mor metastases and gave support to the clinicians in their therapeutic approach. A combination of PTC and NB increases diagnostic accuracy markedly, and a negative finding by both techniques should eliminate unnecessary surgery.

6472 ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY: EVALUATION BASED ON EXPERIENCE WITH 805 EXAMINATIONS. (Eng.) Seifert, E. (Staedt Krankenhaus Kemperhof, Koblenzerstr. 115, 5400 Koblenz, W. Germany). *Am. J. Gastroenterol.* 68(6): 542-549; 1977.

Endoscopic retrograde cholangiopancreatography (ERCP) was evaluated on the basis of 805 examinations. Visualization of the common bile duct and the pancreatic duct was possible in 44%, of the common bile duct in 22%, and of the pancreatic duct alone in 24.6% of the cases. The ductal systems were not opacified in 9.4%, but the failure rate decreased from 18.2% to 5.4% within increasing experience. Pathological changes were found in both ducts in 2%, in the common bile duct in 42.2%, and the pancreatic duct in 11.4% of the cases. Diagnostic information was supplied by ERCP in 84.4% of the cases. Complications developed in four cases (acute pancreatitis in 3 and cholangitis in 1). There was no mortality in the entire series. It is concluded that ERCP is a valuable diagnostic method that is frequently successful and reasonably safe.

6473 PERCUTANEOUS TRANSHEPATIC DRAINAGE CATHETER: A VALUABLE THERAPEUTIC AID IN OBSTRUCTIVE JAUNDICE. (Eng.) Probst, P.; Castenada-Zuniga, W. R.; Amplatz, K. (Univ. Minnesota Hosp., 420 Delaware St. S.E., Minneapolis, MN 55455). *Fortschr. Geb. Rontgenstr. Nuklearmed.* 128(4):443-445; 1978.

The case of a 64-yr-old woman in whom the operative diagnosis of sclerosing cholangitis was made is presented. Following the right nephrectomy and cholecystostomy during which fibrosis, chronic inflammation, and common bile duct tumor were found, bile abscess and intra-abdominal sepsis developed but responded to antibiotics. The patient was discharged but was later readmitted for increasing jaundice; her bilirubin was 11.7 mg/dl. A transhepatic cholangiogram revealed obstruction of the right main bile duct in the porta hepatis. Percutaneous drainage of the biliary system was undertaken; the average daily drainage was 400-700 cm^3. After discharge, the patient was treated by replacement of bile salts and sodium; her bilirubin fell to 6.5 mg/dl after 1 week, to 2.7 mg/dl after 3 weeks, and to normal after 1 month. The transhepatic catheter continued to drain for 3 months, and the cholecystostomy tube began to drain bile as well. A choledochojejunostomy is planned. The main indications for percutaneous decompression of the biliary system are preoperative decompression and primary decompression in patients with obstructive neoplastic disease. The catheter should be advanced under fluorescopic control into one of the major radicles or preferably into the distal common bile duct beyond the point of obstruction.

6474 HEPATO-BILIARY SCINTIGRAPHY AND HEPATOGRAPHY WITH Tc-99m DIETHYL-ACETANILIDO-IMINODIACETATE IN OBSTRUCTIVE JAUNDICE. (Eng.) Nielsen, S. P.; Trap-Jensen, J.; Lindenberg, J.; Nielsen, L. M. (Frederiksberg Hosp., DK-2000 Copenhagen F, Denmark). *J. Nucl. Med.* 19(5):452-457; 1978.

To determine whether serial hepatobiliary scintigraphy can be transformed into a quantitative excretory liver function test and if patients with significant obstruction of the common bile duct can be investigated by this method, ^{99m}Tc-diethyl-acetanilido-iminodiacetate (^{99m}Tc-diethyl-IDA) was used for combined serial hepatobiliary scintigraphy and processing of hepatographic curves; a scintillation camera and an image-processing system were used in 7 normal subjects and 34 patients with common bile duct obstruction. In normal fasting subjects and patients with moderate biliary obstruction, the liver was seen at 1-3 min after i.v. injection, and reached maximum intensity at 10 min. In patients with moderately elevated levels of serum bilirubin and alkaline phosphatase, sufficient anatomical information was obtained by serial hepatobiliary scintigraphy for 30 min. Complete obstruction was diagnosed by the absence of intestinal radioactivity 24 hr after injection. Hepatograms from an area of interest corresponding to the periphery of the right liver lobe varied predictably with changes in the serum levels of alkaline phosphatase and bilirubin. In normal subjects, the time-activity curve in this area had a maximum of about 10 min. Both anatomical and functional information was obtained. The investigation could be carried out even under reduced liver function. Hepatic uptake of the agent was noted at serum alkaline phosphatase levels up to 1,000 U/l and serum bilirubin levels up to 170 μM. Although the anatomical information derived from ^{99m}Tc-diethyl-IDA cholescintigraphy is less detailed than that of radiologic methods, this technique can become a valuable diagnostic aid in cases of obstruction so severe that radiologic contrast methods are useless or if the patient is sensitive to contrast media.

6475 SERUM BILE ACIDS AS RELATED TO BILE ACID SECRETION IN LIVER DISEASE. (Eng.) Shaffer, E. A.; Gordon, E. R. (Gastrointestinal Res. Unit, Univ. Calgary, Calgary T2N 1N4, Alberta, Canada). *Am. J. Dig. Dis.* 23(5):392-397; 1978.

The level of serum bile acids and their rate of secretion into the duodenum were measured in normal subjects and patients with cholesterol gallstones and hepatobiliary disease to determine if changes in serum bile acids reflect alterations in bile acid secretion within the enterohepatic circulation, especially in association with disordered bile acid metabolism and liver dysfunction. To quantitate bile acid secretion, an intestinal marker perfusion technique was used that measured duodenal output under stimulated but steady-state conditions. Dur-

ing these perfusion studies, serum bile acids were determined at hourly intervals. In the 28 normal subjects, serum bile acids during fasting were low (6.6 ± 0.7 μM) with only a modest rise occurring after a fat meal (7.6 ± 0.7 μM). The average bile acid secretion rate in these subjects was 1,321 μmol/hr, and little fluctuation was noted in the serum levels (7.5 ± 0.8 μM) during the perfusion studies. The five patients with cholesterol gallstones demonstrated a decreased rate of bile acid secretion at 714 μmol/hr ($p<0.05$) but had normal serum values. In 15 gallstone patients who had undergone cholecystectomy, the bile acid secretion rate increased to 1,411 ± 103 μmol/hr without any corresponding change in serum levels. In 19 patients with liver disease, however, serum bile acids were elevated ($p<0.05$) while bile acid secretion was reduced ($p<0.05$). Thus, in normal subjects, the liver is capable of handling an increased endogenous bile acid return with only a small rise in serum levels. In liver disease, bile acid secretion is reduced while serum concentrations are increased, implying a defect in bile acid handling by the liver. In cholesterol gallstone disease, serum levels do not reflect the abnormality in bile acid metabolism. The relation between bile acid concentration in the serum and secretion rate into the enterohepatic circulation is dependent on whether hepatic dysfunction is present or if bile acid metabolism is abnormal.

6476 BILIARY BILE ACIDS IN UNCOMPLICATED PREGNANCY AND IN CHOLESTASIS OF PREGNANCY. (Eng.) Laatikainen, T.; Lehtonen, P.; Hesso, A. (Univ. Central Hosp., Haartmaninkatu 2, SF-00290 Helsinki 29, Finland). *Clin. Chim. Acta* 85(2): 145-150; 1978.

Bile salt metabolism of conjugated and sulfated bile acids was studied in gallbladder bile samples from four pregnant women at term and from two patients with cholestasis of pregnancy by gas-liquid and high-pressure liquid chromatography. In healthy pregnant women, the mean ratio of cholyl/chenodeoxycholyl/deoxycholyl glycine was 3.7:1.0:0.23 and that of the taurine conjugates 3.0:1:0.25, resp. In the gallbladder bile pool of nonpregnant women, these ratios were 1.0:1:0.99 and 1.0:1:0.70, resp. Thus, cholic acid predominated in pregnancy bile. In patients with cholestasis of pregnancy, cholic acid comprised 90% of total biliary bile acids, the proportion of chenodeoxycholic acid was greatly decreased, and nonsulfated deoxycholic acid was not detected. The proportion of sulfated bile acids in total biliary bile acids was between 0.4 and 1.2% in uncomplicated pregnancy and 0.3 and 0.5% in patients with cholestasis. The results suggest that there is a shift to a more extensive biliary excretion of taurine as compared to glycine conjugates of bile acids during pregnancy.

6477 LECITHIN-CHOLESTEROL ACYLTRANSFERASE AND THE LIPOPROTEIN ABNORMALITIES OF OBSTRUCTIVE JAUNDICE. (Eng.) Agorastos, J.; Fox, C.; Harry, D. S.; McIntyre, N. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Clin. Sci. Mol. Med.* 54(4):369-379; 1978.

Plasma lipoprotein abnormalities were studied in 16 patients with obstructive jaundice to test the hypothesis that the abnormalities correlate with plasma lecithin-cholesterol acyltransferase activity. Very low-density lipoproteins (VLDL) were normal in composition and had a normal pre-β electrophoretic mobility when lecithin-cholesterol acyltransferase activity was high. When it was low, VLDL had abnormal composition and ran in the β position. With high lecithin-cholesterol acyltransferase activity, low-density lipoprotein (LDL) was normal, and cholestatic LDL (LP-X) was not found. With low lecithin-cholesterol acyltransferase activity, up to three LDL fractions were found: (a) large triglyceride-rich particles, (b) LP-X, and (c) a triglyceride-rich cholesteryl ester-poor particle of normal dimensions. High-density lipoprotein (HDL) concentrations correlated with lecithin-cholesterol acyltransferase activity, and HDL were normal ultrastructurally and in composition when the activity was high. When lecithin-cholesterol acyltransferase activity was low, HDL was abnormal in composition, and "stacked discs," together with normal spherical particles, were seen ultrastructurally. These results suggest that low lecithin-cholesterol acyltransferase activity may cause at least some of the lipoprotein changes of obstructive jaundice.

6478 LYSOSOMAL DEGRADATION OF BILE DEPOSITS IN CHOLESTASIS: AN ULTRASTRUCTURAL AND CYTOCHEMICAL STUDY. (Eng.) Faria, V. (Medical Sch., Univ. Oporto, Oporto, Portugal). *Virchows Arch. [Cell Pathol.]* 24(4):355-358; 1977.

To elucidate the intracellular fate of hepatocytic bile deposits in cholestasis, liver biopsy specimens obtained at laparotomy from six patients with obstructive jaundice were examined by light and electron microscopy. Membranous and lamellar structures of variable electron density incorporated into vacuoles of different sizes were seen in many hepatocytes. These structures had the characteristic appearances of bile deposits and contained acid phosphatase activity as judged by the deposition of lead phosphate reaction product. The size and intensity of the deposits varied among vacuoles. These results provide additional evidence to support the hypothesis that lysosomes participate in the elimination of retained bile from hepatocytes. It is probable that lysosomal degradation is an important mechanism of intracellular elimination of deposited bile.

6479 CALCIFIED GALLBLADDER (PORCELAIN GALLBLADDER). (Eng.) Ashur, H.; Siegal, B.; Oland, Y.; Adam, Y. G. (Asaf Harofe Hosp., Tel-Aviv Univ., Zerifin, Israel). *Arch. Surg.* 113(5):594-596; 1978.

The cases of five patients with calcified ("porcelain") gallbladder are presented. The disease appeared mostly in the sixth decade of life (the pa-

tients were 62, 61, 41, 75, and 75 yr old) and was more prevalent in women (4/5 patients). The presenting symptoms included abdominal or retrosternal pain in all patients and vomiting or diarrhea in some. Gallbladder calcification was observed by a simple flat plate of the abdomen in four cases, and the remaining case was diagnosed at surgery. Oral cholecystography or i.v. cholangiography showed a nonopacified gallbladder in all cases examined and a narrowed common duct in two. Calcification was associated with gallstones in four cases and with a poorly differentiated adenocarcinoma in the fifth. The findings in these patients and those reported in the literature indicate that surgery should not be delayed even if the patient is asymptomatic, since the occurrence of carcinoma in porcelain gallbladder is remarkably high. The diagnostic work-up should include other roentgenographic examinations in addition to the flat abdominal plate, to exclude calcification of other viscera or the thoracic wall.

6480 THE CLINICAL SIGNIFICANCE OF GALLSTONES AND THEIR RADIOLOGICAL INVESTIGATION. (Eng.) Earlam, R. J.; Thomas, M. (London Hosp., London, England). *Br. J. Surg.* 65(3):164-167; 1978.

To analyze the clinical symptoms of gallstones and to correlate them with findings from radiological investigations, 122 patients (98 women and 24 men) with gallstones were examined. No specific indigestion was present that could be termed "flatulent dyspepsia." Sensitivity to fatty foods occurred in 69%, heartburn in 42%, regurgitation of acid-tasting or bitter fluid to the mouth in 31%, and increased passage of flatus from the stomach upwards in 38%. If the gallbladder concentrated contrast medium on a p.o. cholecystogram but did not contract after a fatty meal, the patients suffered less heartburn than if the gallbladder functioned normally. The cholecystogram was performed in 111 patients and revealed 60 multiple stones (>10) and 36 solitary stones. However, since surgeons rarely perform a cholecystectomy for flatulent dyspepsia alone, knowledge of gallbladder function may be necessary.

6481 'POLYMER PIGMENTS' IN HUMAN PIGMENT GALLSTONES. (Eng.) Wosiewitz, U.; Schroebler, S. (Inst. Medical Physics Univ., D-4400 Munster, W. Germany). *Naturwissenschaften* 65(3):162-163; 1978.

To examine whether the black "polymer pigment" in human pigment gallbladder stones is polymerized from bile pigments with a tetra- or with a dipyrrolic structure, gallbladder bile samples obtained by intraoperative puncture from patients who underwent cholecystectomy for pigment cholelithiasis were tested for dipyrrolic compounds by the Stokvis reaction. The black polymer pigment was separated by extraction from the soluble bile pigments, subjected to chromate degradation (oxidation), and analyzed by thin-layer chromatography (TLC). For comparison, biliverdin, urobilin, polymerized propentdyopent, and fecal pigment ("mesobilifuscin") methylesters were also chromate degraded and analyzed by TLC. Bile pigments with a tetrapyrrolic structure (biliverdin and urobilin methylesters) were oxidized to both maleimides and pyrrole dialdehydes. The black polymer pigment also gave this pattern. Polymerized propentdyopent and mesobilifuscin methylesters, both polymerized from dipyrrolic monomers, did not yield pyrrole dialdehydes. The results cannot exclude that dipyrrolic polymers are involved in the formation of the black polymer pigment, but it is not composed entirely of such derivatives. It is concluded that the black polymer pigment of human pigment gallstones is based chiefly on the polymerization of tetrapyrrolic bile pigments.

6482 GALLSTONE DISSOLUTION BY CHENODEOXYCHOLIC ACID AND PHENOBARBITAL. (Eng.) Marks, J. W.; Sherman, J. H.; Bonorris, G. G.; Chung, A.; Coyne, M. J.; Schoenfield, L. J. (Cedars-Sinai Medical Center, 8700 Beverly Blvd., Box 4870, Los Angeles, CA 90048). *Am. J. Gastroenterol.* 69(2): 160-165; 1978.

Gallstone dissolution and biliary lipids were determined and compared in patients receiving either chenodeoxycholic acid (CDC, 28 patients) or CDC and phenobarbital (PB, 20 patients) for 1.5-2 yr, to determine whether PB enhances CDC-induced gallstone dissolution. Among patients with radiolucent gallstones, dissolution occurred in 53% of those receiving CDC alone and in only 25% of those receiving both CDC and PB. No dissolution occurred in 13 other patients with calcified gallstones. Patients with dissolution had a significantly greater molar percentage of CDC ($p<0.02$) and a significantly lower saturation index in bile than those without dissolution ($p<0.01$). Diarrhea and transiently abnormal liver function tests were the most frequently observed side-effects, but only diarrhea necessitated a reduction of the CDC dose. Gallstones recurred following dissolution in one of six patients followed for 6 months after discontinuation of CDC. In conclusion, PB did not enhance either CDC-induced desaturation of bile or gallstone dissolution.

6483 STENOSING ODDITIS: DIAGNOSIS AND TREATMENT. REPORT OF 109 CASES. (Fre.) Lataste, J.; Guegan, Y.; Albou, J. C. (Hopital Intercommunal de Creteil, 40, avenue de Verdun, 94 Creteil, France). *J. Chir. (Paris)* 114(5):317-328; 1977.

A series of 109 patients treated for stenosing oddditis represented only 4.5% of all patients with benign lesions of the extrahepatic bile ducts. Clinical signs were episodes of severe pain (91%), icterus (63%), and hyperthermia (41%); these symptoms were of long duration in 74% of the patients. Radiologically, the lower choledochus showed a characteristic image of stenosis, but this was often obscured by a dilated bile duct. The diagnosis had to be confirmed surgically in 103 patients. Peroperative radiomanometry showed no duodenal passage in 19/76 patients or elevated pressure in 45/76 patients; the pressure was normal 4 times. The odditis was almost always accompanied by lithiasis and/or pancreatitis. Treatment was surgi-

cal: sphincterotomies (72) in patients under 50 yr or when there was reflux in a dilated Wirsung's canal with associated pancreatitis and biliary derivations (35) in older or weaker patients, especially when the common bile duct was very dilated. Surgical results were good in 84 patients; there were 8 instances of minor complications and 17 of major complications (11 were fatal). Long-term results were better and local complications occurred less frequently when biliary derivations were performed. Since the presence of chronic pancreatitis did not seem to aggravate the odditis, sphincterotomies should not be performed routinely, but reserved for young patients with only slightly dilated common bile ducts. For all other patients, biliary derivations should be the treatment of choice.

6484 GRANULAR CELL MYOBLASTOMA OF THE GALLBLADDER. (Eng.) Ishii, T.; Iri, H.; Yamamoto, S.; Shinozawa, Y.; Sudoh, M. (Keio Univ. Sch. Medicine, 35, Shinanomachi, Shinjuku-ku, Tokyo 160, Japan). *Am. J. Gastroenterol.* 68(1): 38-44; 1977.

6485 UNUSUAL ECHOGRAPHIC APPEARANCE OF A COURVOISIER GALL BLADDER. (Eng.) Weeks, L. E.; McCune, B. R.; Martin, J. P.; O'Brien, T. F., Jr. (Bowman Gray Sch. Medicine, Winston-Salem, NC). *J. Clin. Ultrasound* 5(5): 341-342; 1977.

6486 ROUTINE OPERATIVE CHOLANGIOGRAPHY: A CRITICAL APPRAISAL. (Eng.) Seif, R. M. (Roanoke Memorial Hosp., Roanoke, VA). *Am. J. Surg.* 134(5):566-568; 1977.

6487 DISOPYRAMIDE-INDUCED INTRAHEPATIC CHOLESTASIS [Letter to Editor]. (Eng.) Meinertz, T.; Langer, K. H.; Kasper, W.; Just, H. (II Medizinische Klinik, Universitat Mainz, D-6500 Mainz, W. Germany). *Lancet* 2(8042):828-829; 1977.

6488 FINE NEEDLE CHOLANGIOGRAPHY (FNC) IN THE NON-JAUNDICED PATIENT [Abstract]. (Eng.) Keller, F. S.; Katon, R. M.; Dotter, C. T.; Bilbao, M. K.; Rosch, J. (Univ. Oregon Health Sciences Center, Portland, OR). *Clin. Res.* 26(2):110A; 1978.

6489 BILIARY TRACT OBSTRUCTION: NEW APPROACHES TO OLD PROBLEMS. (Eng.) Blumgart, L. H. (Royal Infirmary, Glasgow G4 OSF, Scotland). *Am. J. Surg.* 135(1):19-31; 1978.

6490 BILIARY TRACT SURGERY. (Eng.) Pickleman, J. R. (Loyola Univ. Medical Center, 2160 South First Ave., Maywood, IL 60153). *Surg. Clin. North Am.* 57(6):1221-1234; 1977.

6491 CHANGING STATUS OF THE NATURE OF CHOLELITHIASIS AND BILIARY LIPID COMPOSITION IN TAIWAN [Abstract]. (Eng.) Hsu, S. C.; Chen, J. S.; Ho, K. J. (Natl. Taiwan Univ. Hosp., Taipei, Taiwan). *Fed. Proc.* 37(3):698; 1978.

6492 IATROGENIC INJURIES TO THE BILIARY DUCTAL SYSTEM. (Eng.) Glenn, F. (New York Hosp.-Cornell Medical Center, New York, NY). *Surg. Gynecol. Obstet.* 146(3):430-434; 1978.

6493 "GALLSTONE ILEUS", TIMES TWO. (Eng.) Giustra, P. E.; Root, J. A.; Killoran, P. J. (Penobscot Bay Medical Center, Rockland, ME 04841). *Am. J. Gastroenterol.* 67(6):613-615; 1977.

6494 VARICES OF THE COMMON BILE DUCT AS A SURGICAL HAZARD. (Eng.) Hymes, J. L.; Haicken, B. N.; Schein, C. J. (Montefiore Hosp., 111 E. 210 St., Bronx, NY 10467). *Ann. Surg.* 43 (10):686-688; 1977.

6495 A COMPARISON OF THE "PHRYGIAN CAP" DEFORMITY WITH BISTABLE AND GRAY SCALE ULTRASOUND. (Eng.) Edell, S. (Univ. Pennsylvania Hosp., Philadelphia, PA 19104). *J. Clin. Ultrasound* 6(1):34-35; 1978.

6496 GRANULAR CELL MYOBLASTOMA OF THE BILIARY TREE. (Eng.) Savage, A.; Devitt, P. (Southmead Hosp., Westbury-on-Trym, Bristol, England). *Postgrad. Med. J.* 53(623):574-577; 1977.

6497 GALLBLADDER WITH ECTOPIC GASTRIC MUCOSA: ULTRASTRUCTURAL ANALYSIS. (Eng.) Runge, P. M.; Schwartz, J. N.; Seigler, H. F.; Woodard, B. H.; Shelburne, J. D. (Duke Univ. Medical Center, Durham, NC). *Arch. Pathol. Lab. Med.* 102(4):209-211; 1978.

6498 DOUBLE PATHOLOGY IN ACUTE CHOLECYSTITIS. (Eng.) Black, R. B. (Queen Elizabeth Hosp., Woodville Rd., Woodville, South Australia 5011, Australia). *Aust. N.Z. J. Surg.* 47(6):798-801; 1977.

See also, 5852, 5853, 5854, 5948, 5958, 5959, 5962, 5998, 6063, 6064, 6065, 6066, 6068, 6069, 6071, 6075, 6076, 6080, 6082, 6083, 6090, 6091, 6092, 6093, 6094, 6095, 6103, 6235, 6236, 6325, 6326, 6328, 6329, 6332, 6356, 6367, 6381, 6390, 6391, 6392, 6400, 6404, 6406, 6408, 6500, 6533.

6499 INCIDENCE AND SIGNIFICANCE OF DIFFERENT TYPES OF CONNECTIVE TISSUE ANTIBODIES IN ADULT AND PEDIATRIC GASTROENTEROLOGICAL DISORDERS. (Eng.) Rizzetto, M.; Bonino, F.; Pera, A.; Barbera, C.; Santini, B. (Ospedale Mauriziano Umberto I, Cs Turati 46, I-10128 Torino, Italy). *Digestion* 17(1): 29-37; 1978.

To evaluate the clinical relevance of connective tissue antibodies (CTA), they were assessed in sera from 3,000 adult and 388 pediatric patients with gastroenterological disorders involving the stomach, esophagus, and duodenum (31%), liver (52%), colon (8%), pancreas (4.5%), and small bowel (4.5%). A standard fluorescein-conjugated antiserum technique was employed. R_1 antibodies were found in 9 adults with celiac disease (8) and Crohn's disease (1) and in 47 children with celiac disease; malabsorption was a constant feature in patients with R_1 antibodies. Adherent cell antibodies were found in 2 children and 101 adults. These antibodies were not associated with any single clinical entity and occurred in patients with and without malabsorption; however, their incidence was 30% in individuals with steatorrhea but only 3% in those without steatorrhea ($p<0.01$). R_2, KC, and Rs antibodies were observed in adults having unrelated disorders without malabsorption. Although R_2, KC, and Rs antibodies seem to have no clinical significance in gastroenterology, R_1 appears to be related to a malabsorption syndrome and adherent cell antibodies are related to primary and secondary malabsorption.

6500 THE PROTEAN GASTROINTESTINAL MANIFESTATIONS OF METASTATIC BREAST CARCINOMA. (Eng.) Chang, S. F.; Burrell, M. I.; Brand, M. H.; Garsten, J. J. (Yale Univ. Sch. Medicine, New Haven, CT 06510). *Radiology* 126(3):611-617; 1978.

Case histories are presented for eight women with breast cancer metastatic to the gastrointestinal tract. Five of the cases were occult, and the patients presented after 7-24 symptom-free yr. In these eight cases, breast cancer metastasized to the esophagus, stomach, colon, uterus, liver, gallbladder, and common bile duct. Some of the cases simulated other diseases, e.g., Crohn's disease or uterine fibroids, which caused difficulty in diagnosis. These findings indicate the importance of being familiar with all the manifestations of metastatic breast cancer and of obtaining a complete medical history.

6501 ANTIBIOTIC-ASSOCIATED DIARRHEA TREATED WITH ORAL TETRACYCLINE. (Eng.) DeJesus, R.; Peternel, W. W. (Mercy Hosp., 1400 Locust St., Pittsburgh, PA 15219). *Gastroenterology* 74(5, Part 1):818-820; 1978.

The cases of three patients with protracted antibiotic-associated diarrhea who did not recover when antibiotics were stopped but had a prompt improvement after tetracycline administration are presented. The patients developed severe, incapacitating diarrhea after antibiotic administration. Presenting features included abdominal discomfort, hematochezia, and hypokalemia from voluminous diarrhea. Roentgenographic studies in one patient were normal, and proctoscopy in two patients failed to show antibiotic-associated colitis. Stool cultures were negative. Despite cessation of antibiotics and symptomatic therapy, the diarrhea continued. After the administration of tetracycline (250 mg, p.o., 4x/day for 1-5 days), the diarrhea stopped without recurrence even after the tetracycline was discontinued. These clinical results suggest that patients with antibiotic-associated diarrhea may benefit from tetracycline when standard medical therapy fails.

6502 PROPHYLACTIC DOXYCYCLINE FOR TRAVELERS' DIARRHEA: RESULTS OF A PROSPECTIVE DOUBLE-BLIND STUDY OF PEACE CORPS VOLUNTEERS IN KENYA. (Eng.) Sack, D. A.; Kaminsky, D. C.; Sack, R. B.; Itotia, J. N.; Arthur, R. R.; Kapikian, A. Z.; *et al.* (Baltimore City Hosp., 4940 Eastern Ave., Baltimore, MD 21224). *N. Engl. J. Med.* 298 (14):758-763; 1978.

A randomized double-blind study was carried out to determine the efficacy of doxycycline (100 mg/day) in preventing travelers' diarrhea among 39 Peace Corps volunteers during their first 5 weeks in Kenya. The volunteers took either doxycycline or placebo for 3 weeks and were observed for an additional 2 weeks. Nine of 21 taking placebo and 1 of 18 taking doxycycline had travelers' diarrhea during the treatment period ($p=0.012$). The protection seemed to persist for at least 1 week after the drug was stopped. Enterotoxigenic *Escherichia coli* was the only pathogen isolated from the placebo group, but was not detected in persons taking doxycycline. None of these organisms were resistant to doxycycline or tetracycline, whereas resistance to tetracyclines and other antibiotics was common among the nonenterotoxigenic *E. coli*. It is concluded that doxycycline effectively prevented most episodes of travelers' diarrhea.

6503 EFFECT OF A LACTOBACILLI PREPARATION ON TRAVELER'S DIARRHEA: A RANDOMIZED, DOUBLE BLIND CLINICAL TRIAL. (Eng.) de Dios Pozo-Olano, J.; Warram, J. H., Jr.; Gomez, R. G.; Cavazos, M. G. (11602 Vantage Hill Rd., Reston, VA 22090). *Gastroenterology* 74(5, Part 1):829-830; 1978.

The effectiveness of prophylactic ingestion of a commercial preparation of lactobacilli (Lactinex) for the prevention or modification of traveler's diarrhea was tested in a randomized double-blind clinical trial in 50 volunteer travelers to Mexico from the United States. Twenty-six subjects received the lactobacilli preparation, and 24 received placebo. The incidence of diarrhea and its duration during the 4 weeks of observation were similar for the two preparations: 35% for lactobacilli-treated subjects and 29% for placebo subjects. Typically, the diarrhea was mild, lasting 2 days. It is concluded that prophylactic ingestion of lactobacilli for 1 week

does not reduce the incidence or duration of traveler's diarrhea, either during the period of ingestion or during the following 3 weeks.

6504 FECAL STEROIDS IN DIARRHEA. II. TRAVELLERS' DIARRHEA. (Eng.) Huang, C. T. L.; Udall, J. N.; Merson, M.; Nichols, B. L. (Baylor Coll. Medicine, Houston, TX 77030). *Am. J. Clin. Nutr.* 31(4):626-632; 1978.

To investigate the hypothesis that fecal steroid profiles may provide a means of biochemical differentiation among episodes of acute diarrhea caused by different etiological agents, fecal bile acid and neutral sterol patterns of five healthy adult volunteers from the United States who contracted travellers' diarrhea (TD) in Mexico City in 1974 were studied by the collection and analysis of fecal samples obtained during and either before or 4 weeks after recovery. The only pathogen in four of these patients was the heat-stable-only enterotoxin-producing strain of *Escherichia coli*. Stool culture for pathogens was negative in the fifth subject. Bacterial 7α-dehydroxylation of cholic and chenodeoxycholic acids was not altered in diarrhea associated with toxigenic *E. coli* heat-stable, although total concentrations of bile acids in the feces in mg/g of feces (wet weight) were decreased during the diarrheal episode (1.3 ± 0.2 versus 3.3 ± 0.4 in controls, $p<0.02$). Consistent with findings on bile acids, no significant changes in the production of coprostanol from cholesterol were observed. Although total concentrations of cholesterol metabolites, in mg/g of feces (wet weight), were reduced in diarrhea, the difference was not significant statistically (2.2 ± 0.9 versus 5.4 ± 0.8 in controls, $p>0.05$). There was an apparent increase in bacterial alteration of fecal steroids in the subject who showed no pathogens in stool culture, despite a decrease in total steroid concentrations of a magnitude similar to those observed in diarrhea associated with *E. coli* heat-stable. The production of coprostanol was correlated with 7α-dehydroxylation of cholic acid ($r=0.829$, $p<0.001$) and chenodeoxycholic acid ($r=0.749$, $p<0.001$). The results from this study are in striking contrast to the changes in gastrointestinal steroid metabolism previously observed in acute shigellosis. In TD associated with ST-*E. coli*, the ability of colonic flora to degrade sterols apparently remains intact, which may explain the lack of change in bacterial degradation of intestinal steroids observed in these patients.

6505 VASOACTIVE INTESTINAL PEPTIDE AND THE WATERY DIARRHEA SYNDROME. (Eng.) Ebeid, A. M.; Murray, P. D.; Fischer, J. E. (Massachusetts General Hosp., Boston, MA 02114). *Ann. Surg.* 187(4): 411-416; 1978.

In an effort to determine whether vasoactive intestinal peptide (VIP) is a mediator in the watery diarrhea syndrome, a sensitive and specific radioimmunoassay for the detection of VIP was used to study 180 healthy controls and various patients with the watery diarrhea syndrome. Normal values for VIP were established as 42.8 ± 2.26 pg/ml in plasma (range 22-70 pg/ml). In 11 patients, the syndrome was associated with tumors, and plasma levels of VIP were elevated (210-2,100 pg/ml). VIP levels returned towards normal in five treated patients coincident with amelioration of symptoms. Normal values were obtained in patients with chronic pancreatitis, sprue, medullary carcinoma, Zollinger-Ellison Syndrome, and laxative abuse. In six other patients with an indistinguishable syndrome and no findings of tumor at laparotomy and autopsy, VIP levels were normal. The results suggest that VIP may be the causative agent in patients with the watery diarrhea syndrome and tumors, but that an indistinguishable syndrome exists for which VIP is not the cause.

6506 EOSINOPHILIC GASTROENTERITIS WITH OBSTRUCTION: IMMUNOLOGICAL STUDIES OF SEVEN PATIENTS. (Eng.) Caldwell, J. H.; Mekhjian, H. S.; Hurtubise, P. E.; Beman, F. M. (Ohio State Univ. Hosp., 410 W. 10th Ave., Columbus, OH 43210). *Gastroenterology* 74(5, Part 1):825-829; 1978.

Seven patients with eosinophilic gastroenteritis presenting with obstruction of the gastrointestinal tract were studied to characterize further this form of eosinophilic gastroenteritis. Five had required surgical treatment for relief of obstructive symptoms or because of diagnostic uncertainty. Immunological studies, including serum immunoglobulins, serum complement, lymphocyte quantitation, and lymphocyte response to nonspecific mitogens revealed no striking abnormalities. No patient was clinically allergic or food sensitive, and serum IgE was normal in all. A review of the literature since 1970 suggests that the obstructive form of eosinophilic gastroenteritis accounts for about half of the reported cases. Allergy, especially hypersensitivity to food, is not required for the diagnosis.

6507 GASTROINTESTINAL INVOLVEMENT IN NON HODGKIN'S LYMPHOMAS: 31 CASES. (Fre.) Najman, A.; Gorin, N. C.; Barranger, C.; Duhamel, G. (Hopital Saint-Antoine, 184, due du Fg Saint-Antoine, F 75571 Paris Cedex 12, France). *Nouv. Presse Med.* 6(38):3515-3519; 1977.

Gastrointestinal involvement was found in 31/200 patients with non-Hodgkin's lymphomas, and is a distinctive feature of this entity. Multiple lesions were present in 61% of the 31 patients; the gastroduodenal area was involved in 68%, the ileum in 45%, and the rectocolon in 61%. A diffuse histologic pattern was predominant (67%). Prolonged polychemotherapy is the treatment of choice, the specific agents depending upon clinical staging of the disease; in addition, radical surgery is indicated for patients in stages I_D or II_D. High energy irradiation (25 grays to the abdomen) may be associated with surgery and a short chemotherapeutic course for lymphosarcomas only. Among 24 patients with lymphosarcomas, the 24-month survival was 75%, and the median survival was 40 months. Of seven

patients with reticulosarcomas, six died within 27 months. Relapses after treatment of primary gastrointestinal localization (8/12) always involved extradigestive tissues (lymph nodes, cavum, and bone).

6508 CALCIFIED PRIMARY TUMORS OF THE GASTROINTESTINAL TRACT. (Eng.) Ghahremani, G. G.; Meyers, M. A.; Port, R. B. (Evanston Hosp.-Northwestern Univ., 2650 Ridge Ave., Evanston, IL 60201). *Gastrointest. Radiol.* 2(4):331-339; 1978.

Experience with 23 primary calcified tumors of the gastrointestinal tract is presented; this information plus information from the literature were used to formulate guidelines for an accurate preoperative diagnosis of such tumors. Histopathologic diagnosis of the tumors was established by endoscopic biopsy, surgery, or autopsy. A retrocardiac mass containing amorphous calcifications was seen to be typical of leiomyoma of the esophagus. Calcific deposits similar to that in uterine fibroids may be the feature of gastric leiomyoma or intestinal leiomyosarcoma. Sand-like deposits within the wall of the stomach or colon were characteristic of a mucinous adenocarcinoma, while clusters of phleboliths in the gastrointestinal wall suggested a hemangioma, particularly if recurrent intestinal bleeding and cutaneous hemangiomas were associated. Sunburst type of calcification in the pancreas indicated a cystadenoma or cystadenocarcinoma of that organ, and aggregates of granular calcifications in the liver were diagnostic for metastatic adenocarcinoma of the colon, but were rarely seen in a primary liver malignancy.

6509 PREVALENCE OF ENDOCRINE ABNORMALITIES IN PATIENTS WITH THE ZOLLINGER-ELLISON SYNDROME AND IN THEIR FAMILIES. (Eng.) Lamers, C. B.; Stadil, F.; Van Tongeren, J. H. (St. Radboud Hosp., Nijmegen, Netherlands). *Am. J. Med.* 64(4):607-612; 1978.

To evaluate the frequency of associated and hereditary endocrinopathies in the Zollinger-Ellison syndrome, 10 patients with the syndrome and 109 family members over 15 yr of age were studied. In 7 of the 10 patients, coexisting endocrine disease was found. In six, the Zollinger-Ellison syndrome was probably a feature of multiple endocrine adenomatosis type 1, whereas Cushing's syndrome in the remaining patient may have been caused by the production of an ACTH-like substance by a mixed pancreatic tumor. All six patients with evidence of multiple endocrine adenomatosis type 1 had relatives with endocrinopathies. In the families of the four other patients with the Zollinger-Ellison syndrome, no endocrine abnormalities were found. During this study, 4 new cases of pituitary tumor, 17 of hyperparathyroidism, 7 of the Zollinger-Ellison syndrome, and 1 of insulinoma were detected. Although most of the disorders were asymptomatic, this clearly indicates that patients with the Zollinger-Ellison syndrome and their families should undergo detailed endocrine studies.

6510 SERUM GASTRIN AND CALCIUM INTERRELATION IN A KINDREDSHIP WITH MULTIPLE ENDOCRINE ADENOMATOSIS [Abstract]. (Eng.) Keith, R. G. (Sunnybrook Medical Center, Toronto, Ontario, Canada). *Ir. J. Med. Sci.* 146(Suppl. 1):18; 1977.

6511 LIVER CHANGES IN KWASHIORKOR. (Eng.) Sengupta, K. P. (No affiliation given). *J. Indian Med. Assoc.* 69(4):91-92; 1977.

6512 ANTACIDS AND GLYCOPYRROLATE [Letter to Editor]. (Eng.) Roberts, R. B. (Wright State Univ. Sch. Medicine, Dayton, OH). *Anesth. Analg. (Cleve.)* 57(1):145-146; 1978.

6513 PRELIMINARY RESULTS OF PHASE I AND II CLINICAL TRIALS OF RFCNU AND RPCNU, TWO NEW NITROSOUREA SUGAR DERIVATIVES IN DIGESTIVE TRACT TUMOURS [Abstract]. (Eng.) Mathe, G.; Hayat, M.; de Vassal, F.; Misset, J. L.; Schwarzenberg, L.; Machover, D.; *et al. In: Medical Oncology. Abstracts of the 3rd Annual Meeting of the Medical Oncology Society and of the Bi-Annual Meeting of the Immunology and Immunotherapy Group (C12G), Nice, December 4-6, 1977.* (Springer International): 3(Suppl.):S20; 1977.

6514 HAEMOLYTIC-URAEMIC SYNDROME IN DYSENTERY [Letter to Editor]. (Eng.) Chu, J. Y.; Gleason, W. A., Jr.; Mestres, H. M. (St. Louis Univ. Sch. Medicine, St. Louis, MO 63104). *Lancet* 2(8046):1025-1026; 1977.

6515 PROTEIN TURNOVER, SYNTHESIS AND BREAKDOWN BEFORE AND AFTER RECOVERY FROM PROTEIN-ENERGY MALNUTRITION. (Eng.) Golden, M. H. N.; Waterloo, J. C.; Picou, D. (Tropical Metabolism Res. Unit, Univ. West Indies, Mona, Kingston 7, Jamaica, West Indies). *Clin. Sci. Mol. Med.* 53(5):473-477; 1977.

6516 CYTOTOXIC EFFECTS OF ALCOHOL ON HEMATOPOIETIC AND INTESTINAL CELLS. (Eng.) Lindenbaum, J. (Harlem Hosp. Center, New York, NY). *Adv. Exp. Med. Biol.* 85A:415-427; 1977.

6517 VIRIONS ASSOCIATED WITH ACUTE GASTROENTERITIS IN VANCOUVER, 1976. (Eng.) McLean, D. M.; Wong, K. S. K.; Bergman, S. K. A. (Div. Medical Microbiology, Univ. British Columbia, Vancouver, British Columbia V6T 1W5, Canada). *Can. Med. Assoc. J.* 117(9):1035-1036; 1977.

6518 TREATMENT OF MASSIVE GASTROINTESTINAL HEMORRHAGE FROM AORTOENTERIC FISTULA. (Eng.) Mehta, A. I.; McDowell, D. E.; James, E. C. (Veterans Admin. Hosp., Clarksburg, WV). *Surg. Gynecol. Obstet.* 146(1):59-62; 1977.

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See also, 5848, 6048, 6051, 6058, 6063, 6067, 6077, 6084, 6085, 6086, 6087, 6088, 6089, 6140, 6153, 6154, 6155, 6181, 6192, 6226, 6251, 6254, 6301, 6317, 6326, 6338, 6341, 6400, 6444, 6466, 6554.

GENERAL

Parasitology

6548 HYDATID DISEASE OF THE LIVER. (Eng.) Barros, J. L. (Hosp. Provincial, Madrid, Spain). *Am. J. Surg.* 135(4):597-600; 1978.

Experience in the surgical management of hydatid disease of the liver in 212 patients over the past 18 yr is reviewed. There was associated pathologic disease of the biliary tract in 47 patients. The most common preoperative complication was rupture into the bile ducts (36 patients). Upper abdominal pain was the most common symptom, and a palpable mass or hepatomegaly was present in two-thirds of the patients. Liver scanning with radioactive isotopes was the most helpful routine diagnostic aid, the results being positive in 91% of the patients. The most common surgical treatment used (148 patients) consisted of removing the parasite (cystectomy) and treatment of the residual pericystic cavity. Pericystectomy involved en block resection of the intact cyst with the entire pericystic layer and was employed in 28 patients. Cholecystectomy was performed in 9 of the 47 patients with biliary tract disease, removal of common duct stones in 3, and evacuation of intraductal membranes in 4. Internal drainage into the gastrointestinal tract was performed in 14 patients with major bile fistulas to the pericystic cavity. Pericystojejunostomy, with a Roux-en-Y anastomosis of jejunum, was performed in 11 patients, and pericystogastrostomy was carried out in 3. The results of therapy were ex-

cellent in 96% of patients with simple cysts. There were eight deaths: four occurred in patients with ruptured hepatopulmonary cysts, one was due to anaphylactic shock after traumatic rupture of a cyst, and two were due to terminal hepatic failure (cirrhosis) and bleeding esophageal varices. One intraoperative death was ascribed to formalin toxicity. Postoperative infections occurred in 29 patients, and recurrent intra-abdominal disease was a late complication that occurred in 18 patients. Conservative excision of solitary or multiple cysts is recommended for most patients with hydatid liver disease. It is important to establish whether hepatic cysts communicate with the biliary tree, and any associated biliary disease should be taken care of at the same time. In patients in whom the cyst has penetrated the diaphragm and communicates with the lung, treatment should be carried out in one stage whenever possible.

6549 ENZYME IMMUNOASSAY FOR THE SERODIAGNOSIS OF PARASITIC INFECTIONS. (Eng.) Ruitenberg, E. J.; Capron, A.; Bout, D.; van Knapen, F. (Natl. Inst. Public Health, P.O. Box 1 Bilthoven, Netherlands). *Biomedicine* 26(5):311-314; 1977.

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6551 PATTERN OF INTESTINAL PARASITIC INFECTION AND SERUM IgG, IgA AND IgM LEVELS IN TIBETANS AND INDIANS. (Eng.) Gupta, R. M.; Gupta, V. M.; Gupta, I. M.; Marwah, S. M. (Inst. Medical Sciences, Banaras Hindu Univ., Varanasi, India). *J. Indian Med. Assoc.* 69(2):31-33; 1977.

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6553 WHY "HEPATIC ARTERY HYPERTROPHY AND SINUSOIDAL HYPERTENSION IN ADVANCED SCHISTOSOMIASIS" [Letter to Editor]. (Eng.) Beker G., S. (Dept. Medicine, Universidad Central de Venezuela, Caracas, Venezuela). *Gastroenterology* 74 (2, Part 1):333; 1978.

6554 THE PREVALENCE OF HUMAN INTESTINAL PROTOZOA IN IBADAN, NIGERIA. (Eng.) Ogunba, E. O. (Univ. Coll. Hosp., Ibadan, Nigeria). *J. Trop. Med. Hyg.* 80:187-191; 1977.

6555 SEVERE ACUTE TOXIC AMOEBIC COLITIS REQUIRING TOTAL COLECTOMY: CASE REPORT. (Eng.) Hof, D. G.; Vergara, G. G.; Hartwig, F. H.; Hill, J. H. (Univ. Minnesota Hosp., Minneapolis, MN). *Mo. Med.* 75(1):21-23, 28; 1978.

See also, 5997, 5998, 6060, 6338, 6499.

GENERAL

Regional Enteritis

6556 PROGNOSIS IN CHILDREN WITH CROHN'S DISEASE. (Eng.) Gryboski, J. D.; Spiro, H. M. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Gastroenterology* 74(5, Part 1):807-817; 1978.

To gain information on the prognosis of Crohn's disease in children, the course of 86 children with Crohn's disease was examined during a 10-yr period, between 1966 and 1976. Patients were classified according to the initial site of disease. Ileocolitis was the most (52%) common and colitis the least (9%) common form of disease with diffuse small bowel or ileal disease each comprising nearly 20% of the study group. These figures show a reversal from those of a previous decade, when 42% of the patients had only terminal ileal disease and 17% had ileocolitis. Children with ileocolitis had the highest number of extracolonic manifestations and operations and required steroid therapy the longest. Those with only small bowel disease (with the exception of duodenal involvement) had fewer extraintestinal symptoms and operations and showed a consistently good response to medical treatment.

6557 THE VARIED MANIFESTATIONS OF CROHN'S DISEASE IN CHILDREN AND ADOLESCENTS. (Eng.) Dubois, R. S.; Rothschild, J.; Silverman, A.; Sabra, A. (Dept. Child Health, Univ. Sydney, Sydney, Australia). *Am. J. Gastroenterol.* 69(2):203-211; 1978.

Experience with 30 children less than 15 yr of age

with histologically or radiologically proven Crohn's disease is reported. The mean age of onset was 9 yr and 5 months. Delay in diagnosis may stem from the varying modes of presentation. The mean delay in diagnosis was 2 yr. Chronic diarrhea and/or recurrent abdominal pain associated with extraintestinal manifestations, particularly abnormalities of growth and development, suggests the possibility of Crohn's disease in the pediatric age group. Involvement of the terminal ileum occurred in 29 of the 30 patients. In addition, colonic disease occurred in 13 and jejunal involvement in 1. Four patients presented with an acute onset of their disease; a favorable response to either medical or surgical therapy occurred in all four. Twenty-six patients had an insidious onset and tended to have a chronic course despite either medical and/or surgical therapy. Thirteen patients had an intestinal resection, with recurrence occurring in three from 1-4 yr postoperatively. To date there has been one death.

6558 A COMPARISON OF THE STRUCTURE AND FUNCTION OF THE TERMINAL ILEUM IN CROHN'S DISEASE USING RADIOLOGY, THE "DICOPAC" SCHILLING TEST AND [^{14}C]G.C.A. BREATH TEST. (Eng.) Glover, S. C.; Mowat, N. A. G. (Dept. Medicine, Univ. Aberdeen, Aberdeen, Scotland). *Eur. J. Nucl. Med.* 3(2):121-124; 1978.

Terminal ileal function was measured by a glycholic acid (GCA) breath test and judged by radiological appearance, and the results were compared to determine whether the breath test might provide additional evidence of terminal ileal disease in patients with Crohn's disease. Twenty patients with biopsy-proven Crohn's disease were studied. Thirteen had radiological evidence of involvement of the terminal ileum. None had significant bacterial overgrowth of the small bowel contents, and none had had resection of the terminal ileum. In all patients, a ^{14}C-GCA breath test and a "Dicopac" Schilling test were performed to assess terminal ileal function (26 patients with functional diarrhea and 44 healthy subjects served as controls for the latter test). The data showed poor correlation between the radiological appearance of the terminal ileum and the results of the functional tests (6/10 patients with abnormal function tests also had abnormal radiological appearance; 7/10 patients with normal function tests had abnormal radiological appearance). There was also poor correlation between the results of the ^{14}C-GCA breath test and the "Dicopac" Schilling test (the tests agreed 11/20 times, of which 10 findings were normal). Without terminal ileal histology, any assessment of the extent of Crohn's disease of the terminal ileum and of its effect on terminal ileal function must include the ^{14}C-GCA breath test as well as radiology and the "Dicopac" Schilling test. The limitations of the ^{14}C-GCA breath test as a test of terminal ileal function in Crohn's disease are discussed.

6559 PLATELET KINETICS IN CROHN'S DISEASE. (Eng.) Bremer, G.; Jacobi, E.; Miller, B.; Ehms, H.; Strohmeyer, G. (2. Medizinische Klinik und Polikinik der Universitat, Moorenstrasse 5, D-4000 Dusseldorf, W. Germany). *Klin. Wochenschr.* 56(7): 365-367; 1978.

To investigate the pathogenesis of thrombocytosis in Crohn's disease, 10 nontreated patients were examined and compared with 10 healthy controls using the ^{51}Cr-labeling technique. There was a significant elevation of platelet count in the patients compared with the controls (550,000 ± 150,000/µl versus 15,000-300,000/µl, $p<0.001$). The average platelet survival time was significantly shortened in the patients compared with the controls (6.9 days versus 9 days, $p<0.001$). Organ scanning for surface radioactivity revealed no differences between the two groups, indicating that neither storing nor sequestration occurred in any of the organs examined (heart, liver, spleen, and bone marrow); the recovery rate for injected ^{51}Cr activity was 55-60%. Platelet turnover was markedly accelerated in the patients (95,000/µl/day) compared with the controls (25,000/µl/day). Platelet function, measured as adhesiveness in the fiber test, was depressed in Crohn's disease compared with controls when the differences in platelet count between the two groups was considered. Platelet production is augmented in Crohn's disease and exceeds the reduced survival time. The increased thrombopoiesis may lead to the production of platelets with a physiological defect and so to increased peripheral elimination. The elevated platelet production remains unexplained. It might be due to the possible thrombopoietic action of certain humoral transmitter substances present only in Crohn's disease.

6560 COMPARISON OF THE RESULTS OF RESECTION, BYPASS, AND BYPASS WITH EXCLUSION FOR ILEOCECAL CROHN'S DISEASE. (Eng.) Homan, W. P.; Dineen, P. (New York Hosp.-Cornell Medical Center, New York, NY). *Ann. Surg.* 187(5):530-535; 1978.

The course of 161 patients with Crohn's disease seen over a 43-yr period who underwent primary surgery for the disease is reviewed to determine the most reliable treatment method. Resection was performed in 115 patients, bypass with exclusion in 25, and side-to-side ileotransverse colostomy in 21. Overall recurrence rates were 25% for resection, 63% for bypass with exclusion, and 75% for simple bypass. At 15-yr follow-up, recurrence rates were 65% for resection, 82% for bypass with exclusion, and 94% for simple bypass. The superiority of resection over either bypass is significant ($p<0.005$ at 5 yr). Much of the difference in final outcome was accounted for by early recurrence or by persistent disease in the two bypass groups. This difference amounted to 21% for the bypass with exclusion and 45% for simple bypass as compared with 3% for patients who had resection. It is concluded that (1) resection can be performed with a morbidity and mortality equivalent to either of the bypass procedures, (2) the recurrence rate following resection is significantly lower than bypass with exclusion or simple bypass and amounts to about 4% per year, (3) continuing disease in the bypassed loop accounts for a high percentage of re-

operations in the bypass groups, while appearance of new disease is the usual problem following resection, and (4) resection is the surgical treatment of choice for ileocecal Crohn's disease.

6561 ORAL 25-HYDROXYVITAMIN D_3 IN TREATMENT OF OSTEOMALACIA ASSOCIATED WITH ILEAL RESECTION AND CHOLESTYRAMINE THERAPY. (Eng.) Compston, J. E.; Horton, L. W. L. (St. Thomas' Hosp., London SE1, England). *Gastroenterology* 74(5, Part 1):900-902; 1978.

Because the therapeutic applications of vitamin D metabolites and analogues have recently become of considerable interest, the use of p.o. 25-hydroxyvitamin D_3 (25-OHD_3) in a woman with Crohn's disease who developed severe histological osteomalacia 2 yr after ileal resection and the start of cholestyramine therapy (4 g, 2x/day). Treatment with 25-OHD_3 (50 µg/day) produced marked biochemical, radiological, and histological improvement after 6 months. It is suggested that cholestyramine, by reducing vitamin D absorption, precipitated the rapid development of osteomalacia in this patient. This case report emphasizes the importance of routine vitamin D supplementation in all patients on long-term cholestyramine therapy, and indicates that even in patients with small intestinal disease or resection, p.o. preparations of vitamin D or its metabolites and analogues may be effective.

6562 ANKYLOSING SPONDYLITIS AND INFLAMMATORY BOWEL DISEASE. I. PREVALENCE OF INFLAMMATORY BOWEL DISEASE IN PATIENTS SUFFERING FROM ANKYLOSING SPONDYLITIS. (Eng.) Meuwissen, S. G. M.; Dekker-Saeys, B.; Agenant, D.; Tytgat, G. N. J. (Dept. Medicine, Univ. Amsterdam, Amsterdam, Netherlands). *Ann. Rheum. Dis.* 37(1):30-32; 1978.

To establish the prevalence of inflammatory bowel disease in ankylosing spondylitis (AS), 79 AS patients underwent detailed medical screening, including sigmoidoscopy and roentgenology. Forty-eight patients had gastrointestinal symptoms, and the others did not. In three patients, a diagnosis of Crohn's disease was made, which had been previously established. In all other patients inflammatory bowel disease was excluded. The prevalence of inflammatory bowel disease in this series of patients with AS therefore was 3.8%. There were two patients without Crohn's disease in whom distal rectal pathology was attributed to local anti-inflammatory treatment. It appears that abdominal symptoms in most of the patients with AS were not related to inflammatory bowel disease, but probably to an irritable bowel syndrome.

6563 ZINC DEFICIENCY IN CROHN'S DISEASE. (Eng.) Solomons, N. W.; Rosenberg, I. H.; Sandstead, H. H.; Vo-Khactu, K. P. (Inst. Nutrition Central America and Panama, Carretera Roosevelt, Zona 11, Apartado 11-88, Guatemala City, Guatemala). *Digestion* 16(1/2):87-95; 1977.

Zinc nutrition was studied using plasma zinc, hair zinc, and taste acuity as indices in 20 adult patients (20-62 yr old) and in 10 adolescent patients (10- to 19-yr old), all of whom were classified as having Crohn's disease (either regional enteritis, ileocolitis, or granulomatous colitis), and the results were compared with those in 20 control adults and 39 control adolescents. The adult patients had a mean plasma zinc concentration of 62.3 ± 9.3 µg% compared with 74.3 ± 9.7 µg% in the controls. Adolescent controls had a mean plasma zinc concentration of 78.6 ± 17.6 µg% compared with 46.2 ± 12.6 µg% ($p<0.001$) in the five adolescent patients with growth retardation or delayed sexual maturation and 75.2 ± 27.7 µg% in the five adolescent patients who maintained normal growth patterns. There was no significant difference between the plasma zinc levels of the 13 adult patients who were taking steroids and the 7 who were not. There was a strong correlation between plasma zinc concentrations and plasma albumin levels for the 20 adult controls, the 20 adult Crohn's patients, and the 5 growth-retarded adolescents ($p<0.001$). Hair zinc content in Crohn's disease tended to be low, but was without the statistical significance observed for plasma zinc. The mean score in the taste detection test of -6.6 ± 4.8 for the 20 adult Crohn's patients was significantly lower ($p<0.001$) than the adult control mean of -2.0 ± 1.5. The mean taste detection score for the five growth-retarded adolescents was -5.2 ± 4.8 compared with -0.8 ± 1.0 for the control adolescents ($p<0.001$). It is concluded that zinc deficiency commonly exists in patients with Crohn's disease and that the low plasma zinc concentrations may reflect a reduction of plasma zinc-binding protein (albumin) due to gastrointestinal loss and/or impaired synthesis.

6564 EXPERIMENTAL EVIDENCE ESTABLISHING THE PRESENCE OF A WALL-DEFECTIVE Pseudomonas-LIKE BACTERIAL VARIANT IN CROHN'S DISEASE [Abstract]. (Eng.) Parent, K.; Mitchell, P. D. (Marshfield Clinic, Marshfield, WI). *Gastroenterology* 72(5, Part 2):1111; 1977.

6565 NATIONAL COOPERATIVE CROHN'S DISEASE STUDY (NCCDS): RESULTS OF DRUG TREATMENT [Abstract]. (Eng.) Anonymous. (Univ. Colorado Medical Center, Denver, CO 80262). *Gastroenterology* 72(5, Part 2):1133; 1977.

6566 SUCCESSFUL TREATMENT OF CROHN'S DISEASE WITH BROAD-SPECTRUM ANTIBIOTICS: INITIAL AND LONG-TERM RESULTS [Abstract]. (Eng.) Moss, A. A.; Carbone, J. V.; Kressel, H. Y. (Univ. Cali-

fornia Medical Sch., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1106; 1977.

6567 THE EFFICACY OF IMMUNOSUPPRESSIVE THERAPY IN CROHN'S DISEASE. A RANDOMIZED LONG TERM DOUBLE BLIND STUDY [Abstract]. (Eng.) Present, D. H.; Wisch, N.; Glass, J. L.; Korelitz, B. I. (Mount Sinai Sch. Medicine, New York, NY). *Gastroenterology* 72(5, Part 2):1114; 1977.

See also, 6228, 6265, 6273, 6297, 6312, 6313, 6314, 6315, 6316, 6317, 6319, 6320, 6321, 6499, 6506, 6528.

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

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5964*
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6319
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5978
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6246
ABSOOD, S.
6452*
ADAM, Y.G.
6479*
ADHAM, N.F.
6200*, 6338*
ADLER, M.
6324*, 6410
ADLER, R.D.
5980
AFONYA, I.I.
6258*
AGAMOV, A.G.
6087
AGAMOVA, K.A.
6172
AGARWAL, M.K.
5954
AGENANT, D.
6316*, 6562*
AGORASTOS, J.
6477*
AHLQVIST, J.
6447*
AIKAWA, T.
6457
AITAKOV, Z.N.
6170
AIVAZIAN, V.P.
6274
AIZAWA, I.
5883*
AKAHANE, M.
5886
AKHMETOV, M.S.
6161
AKHTAR, M.
6240
AKIMOV, A.M.
6162
ALAMI, S.Y.
6222*
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6539
ALBOU, J.C.
6483*
ALLEMAND, H.
5974
ALLOATTI, D.
5857*
ALONGE, A.A.
6552
ALONSO, A.
6539
ALPERI, E.
6351*, 6360*
ALTER, H.J.
6429*
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6227
AMBEGAOKAR, S.D.
6254
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6150
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5990
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6550
ANFOSSI, G.
6260*
ANGELIN, B.
6365*
ANSELL, I.F.
5905*
ANTEZANA, C.
5959*
ANTONELLE, P.
6127
APLIN, C.E.
6106
APPELMAN, H.C.
5979
APPELQVIST, P.
6097
ARAKELOV, G.S.
6089
ARANO BERMEJO, J.I.
6268
ARBULIEV, M.G.
6035
ARDEMAN, S.
6204*
ARHAN, P.
6262*
ARMATO, U.
5990
ARTEMOV, C.T.
6163
ARTHUR, R.R.
6302*
ARVANITAKIS, C.
6061*, 6252, 6319
ASHUR, H.
6479*
ASOH, R.
5872*
ATHANASCULIS, C.
6360*
ATTERBURY, C.E.
6466*
ATTIA, A.A.
6313*
AUER, I.O.
6088
AURES, D.
6195*
AUTH, D.C.
6042*
AVDALBEKYAN, S.K.
6089
AVERYANOVA, L.P.
6031
AYRAULT, M.
6460*
BACHELET, M.
6039
BACK, P.
6378
BADIAL-ACEVES, F.
5880*
BAEYENS, R.
5878*
BAGBY, G.C., JR.
6417*
BAKER, R.K.
5967*
BALABAUD, C.
5979
BALAZS, M.
6366*
BALDI, F.
6197
BALIKAN, J.B.
6222*
BALTA, N.
6462*
BALTHAZAR, E.J.
6133
BANK, S.
5938*
BARAKAT, R.M.R.
6260*
BARBARA, L.
6179, 6197
BARBERA, C.
6499*
BARBEZAT, G.C.
5914, 5938*
BARKER, L.F.
5995, 6427*
BARNHART, J.L.
6053
BARON, J.H.
6142*
BARRANGER, C.
6507*
BARROS, J.L.
6548*
BARTALENA, C.
6263
BARTALENA, G.
6265
BARTELSMAN, J.
6096*
BARTHOLOME, W.
6132
BARTON, L.
6519
BARZILAI, D.
6422
BASKIN, W.N.
5845*, 6180
BASSI, F.
6265
BASTL, C.P.
5864

BATES, R.J.
6333*
BATESON, M.C.
5963*
BATEY, R.
6373
BATTISTINI, N.
5991
BALE, A.E.
5971*
BAUER, F.L.R.
6015*
BAUMANN, H.
6159*
BAUMANN, J.B.
6033
BAVA, A.
6034
BAZAN, J.L.
5857*
BEAL, J.M.
6242
BEAVER, M.
5961*
BECKER, H.
6130
BECKERS, J.
6251
BECKNELL, W.E., JR.
6077
BEHAN, M.
6066*
BEKER G., S.
6553
BELAICHE, J.
6139*
BELL, G.D.
6469*
BELL, J.I.
5868
BELL, M.J.
6519
BELSEY, R.
6100
BELSITO, A.
6143*
BEMAN, F.M.
6506*
BENFIELD, J.R.
6364*
BENHAMOU, J.P.
5974, 6355*, 6443*
BERARDI, R.S.
6077
BERG, G.
6176
BERGES, J.
6002
BERGMAN, S.K.A.
6517
BERGSTROM, P.
5923
BERK, J.E.
6067*
BERLATZKY, Y.
6245
BERMAN, M.D.
6465*
BERNARD, C.
6311
BERNARDI, M.
6380
BERNIER, J.
5933*, 6139*
BERSIMBAEV, R.I.
5912
BERTERMANN, R.E.
5908*
BERTHOLD, P.
6379
BERTRAM, P.C.
6454*
BERTRAND, J.L.
6296
BESSOFF, J.
6455*
BEUCLER, I.
6460*
BEVAN, G.
6204*
BHARUCHA, P.E.
6254
BHASKAR, R.
6536
BHATTACHARYA, S.
6439
BIANCHI, R.G.
5926
BIASCO, G.
6197
BIERTI, L.
6189
BILBAO, M.K.
6408
BILLINGTON, T.
6012*
BINDER, M.J.
5864, 6021
BINDONI, M.
6034
BIRCH, G.G.
6050
BIRCHER, J.
6352*, 6541
BIRGE, S.J.
6030
BISTRIAN, B.R.
6350
BLACK, R.B.
6498
BLACK, S.H.
6433*
BLACKBURN, G.L.
6350
BLACKSTONE, M.O.
6332
BLANC, D.
6016*
BLANCHARD, M.H.
5893
BLOMHOFF, J.P.
6354*
BLOOM, S.R.
5889
BLOUSTEIN, P.A.
6386
BLUM, A.L.
6214
BLUMGART, L.H.
6241, 6489
BOCHENEK, W.
5862*
BODEN, G.
5934*
BOESBY, S.
5892
BOGUSLAVSKII, L.S.
6300
BOLENDER, R.P.
5952*
BOLIN, T.D.
5957
BOLTON, J.P.
5907*
BONDARENKO, I.I.
5915
BONE, D.
6156
BONFILS, S.
5924, 6212, 6262*
BONINO, F.
6499*
BONNEL, F.
6068
BONORRIS, G.G.
6482*
BONVICINI, F.
5969*
BOOTELLO, A.
6359*
BORDEAUX, R.A.
5887
BOREL, G.A.
5969*
BORGSTROM, B.
5947
BORIES, P.
6443*
BORRIELLO, S.P.
6259*
BOSENBERG, L.
6090
BOSSECKERT, H.
6273
BOTTICHER, H.
6297
BOUCHIER, I.A.D.
5963*
BOURASSA, D.
6024
BOURDEL, G.
5957*
BOURRY, J.
5936*
BOUT, D.
6549
BOWEN, J.C.
5910*
BRACE, R.A.
6054
BRADBROOK, R.A.
6187
BRADLEY, E.L., III
6349

BRADLEY, R.D.
6407
BRAND, M.H.
6500*
BRANNAN, M.
6181
BRASLOW, L.
6115
BRAULT, B.
6470*
BRAY, G.A.
6230
BREE, R.L.
6533
BREMER, G.
6559*
BRETHOLZ, A.
6408
BRETON, M.
6237
BRITO, A.C.
6059*
BRIZZI, E.
5844*
BROCK-UTNE, J.G.
5874*
BROOKS, C.M.
6458
BROOKS, L.A.
5930
BROTHERTON, T.
6519
BROWN, B.R., JR.
5966*, 5967*
BRUCKNER, R.
6305
BRUEL, J.M.
6068, 6094, 6409
BRUNS, D.
6121
BRUSILOVSKII, M.I.
6269, 6292, 6294
BRUSORI, G.
6265
BUCHANAN, K.D.
6152
BUCHANAN, N.
6522
BUFFET, C.
6401
BUGACH, B.
6137*
BUHAC, I.
6420*
BULL, T.B.
6368*
BULTMANN, V.
6148
BUNCOVA, M.
5993
BUNTAIN, R.L.
6336*
BURGENER, F.A.
5948*
BURKE, E.L.
6129
BURRELL, C.J.
6433*
BURRELL, M.I.
6110, 6500*
BURY, K.D.
6043*
BUSH, J.C.
5910*
BUSING, C.M.
6231
BUSSE, H.J.
6406
BUTEL, J.
5933*
BUTLER, M.L.
6045*
BUTLER, W.H.
5960*
BUTS, J.P.
6024
BUTZOW, G.F.
5984
BYNUM, T.E.
6123
CABRE-FIOL, V.
6135*
CACHIN, M.
6296
CAFLISCH, C.R.
5946
CALANDRA, S.
5991
CALDWELL, J.F.
6506*
CALENOFF, L.
6109
CALLISON, C.A.
5906*, 5926
CAMBIELLA, M.
6189
CAMERON, J.L.
6346, 6356*, 6357*
CAMPICHE, C.
6034
CAMPURINI, S.
6276
CANTOR, D.
6073
CAPRON, A.
6545
CARBONE, J.V.
6500
CARE, A.D.
5856*
CARLSON, H.C.
6318*
CARLSON, J.A.K.
6525
CARLSSON, F.E.
6044*
CARNEY, E.A.
6451*
CARTER, D.C.
5905*
CASADIC, R.
6179
CASSIN, S.
5859*
CASTELL, D.C.
6125
CASTENADA-ZUNIGA, W.R.
6473*
CASTERLINE, P.F.
6545
CASTRO, G.A.
5880*, 6240
CATTAN, D.
6139*
CAVALOS, M.G.
6503*
CAVAZZUTI, F.
6376
CEDGARD, S.
6041*
CHABOT, J.R.
6258*
CHADWICK, K.G.
6444*
CHANDER, A
5999
CHANDLER, J.G.
6224*
CHANDRASEKARAN, R.
6536
CHANG, L.
5961*
CHANG, S.F.
6500*
CHAPUT, J.C.
6309, 6401
CHARBONNIER, A.
6296
CHARNEY, A.N.
5870
CHAUDRY, I.F.
5971*
CHAUX, J.L.
6298
CHAWLA, S.K.
6471*
CHELI, R.
6215, 6228
CHEN, J.S.
6491
CHENG, J.C.
6341*
CHEUNG, L.Y.
5898*, 5906*
CHIARANTANI, E.
5965*, 5976
CHIEN, S.
6445*
CHILDRESS, M.H.
6111
CHIOTELIS, E.
6075, 6076
CHMURA, J.
5918
CHO, K.J.
6327
CHOLEWA, M.
5918

CHOUDHURY, U.
6537
CHOUSTERMAN, M.
6244
CHRISTIANSEN, L.A.
5992
CHRISTIANSEN, P.M.
6153
CHRISTIE, D.L.
6117
CHU, J.Y.
6514
CHUANG, S.
6112
CHUANG, V.P.
6327
CHUNG, A.
6482*
CHUNG, R.S.K.
6326
CIANCAMERLA, G.
6215
CIANI, P.A.
5844*
CIESZKOWSKI, M.
5939*
CLAGETT, G.P.
6421*
CLAIR, J.E.
5938*, 6022
CLANCY, R.
6314*
CLARKE, A.K.
6464*
CLERICI, M.
6288
CLOAREC, M.
6460*
CLOIX, J.F.
6039
COCHRANE, A.M.G.
6442*
COHEN, B.J.
6437, 6438
COHEN, E.B.
6418*
COHEN, M.M.
5907*, 6195
COHEN, S.
5875*, 6263*
COLES, M.E.
6062*
COLON, A.R.
6456*
COMBES, B.
6053
COMPSTON, J.E.
6561*
CONN, H.O.
6455*, 6466*
CONNOR, T.B.
6452*
CONTINI, S.
6363*
CONTRERAS, A.
5959*
COOK, R.
5891
COOKE, A.R.
5879*
COOPER, A.D.
6107*
COOPER, M.
5855*
COOPERMAN, P.
6306*
COPELAND, E.M.
5880*
CORINALDESI, R.
6179
CORNELL, H.J.
6249*
CORNELL, N.W.
5955*
CORNU, M.
5972*
CORRODI, P.
6408
CURTINA, H.
6539
COSSART, Y.E.
6437, 6438
COSTALES, F.
5964*
COUCH, E.F.
5883*
COURSAGET, P.
6443*
COUTURIER, C.
6118
COX, P.F.
6071
COY, D.H.
5939*
COYNE, M.J.
6482*
CRAIG, J.P.
6527
CREAMER, B.
6250*
CREUTZFELDT, W.
5988
CRIPPS, D.J.
6369*
CRISTINA, M.L.
6262*
CROSBIE, W.A.
6363*
CROVETTI, F.
5991
CROW, K.E.
5955*
CRUSE, P.
6114
CULLENS, H.
6431*
CUMMINGS, J.H.
6018*
CZUK, G.
5984
DAFFNER, R.F.
6107
DAJANI, E.Z.
5908*, 5926
DALY, J.
6227
DALY, J.M.
6240
DAMMANN, H.G.
5984
DANZO, B.J.
6004
DARNIS, F.
6367*, 6382
DARRELL, R.W.
6432*
DASHER, C.A.
6403, 6404
DASSIOU, A.
6075
DAVIDSON, C.S.
6393
DAVIS, A.E.
5997
DAVIS, C.
6452*
DAVIS, H.H., II
6459*
DAVIS, R.E.
6102
DAY, D.W.
6463*
DAY, R.C.
6381
DE DIOS POZO-OLANO, J.
6503*
DE GROAT, W.C.
5881*
DE HAAS, W.H.D.
6316*, 6317*
DE LEAN, A.
6005
DE LORIMIER, A.A.
6361*
DE NECHAUD, B.
6002
DE PEYER, R.
6092
DE SOUZA CARVALHO FILHO, R.
6173
DE VASSAL, F.
6513
DEBAS, H.T.
5877*, 5932*
DEBAT, J.
6118
DEBRAY, C.
6118
DEBRAY, J.
6460*
DECAIRES, G.F.
6112
DECKER, R.
6425*
DEGOTT, C.
5974, 6355*, 6443*
DEJESUS, R.
6501*
DEKKER-SAEYS, B.J.
6316*, 6317*, 6562*
DEKKER, W.
6096*, 6196

DELAHAYE, R.P.
6306
DELANEY, J.P.
6190
DELMONT, J.
6237
DEMEESTER, T.R.
6141*
DEMETRIOU, A.A.
5951*
DEMPSEY, P.J.
6065*
DEN HARTOG JAGER, F.C.
6131
DENIS, J.
6382
DENNIS, M.B.
6042*
DEROJAS, J.F.
6074
DESCATOIRE, V.
5974
DESOUZA, L.J.
6392
DETOURNAY, G.L.
6291
DEVITT, P.
6456
DEWHURST, D.G.
5937*
DEYOUNG, D.W.
6051
DHARIWAL, K.R.
5999
DI FEBO, G.
6197
DI FRANCESCO, G.
6175
DIAMANT, N.E.
5985
DICKINSON, P.G.
6143*
DIENA, B.B.
6048
DIENSTAG, J.L.
6427*
DIETZE, R.
6090
DILLARD, P.
6420*
DIMOPOULOS, G.E.
5874*
DINEEN, P.
6560*
DINER, W.
6058*
DIONNE, L.J.
6289
DOBIAS, B.
6226*
DODGE, J.A.
6528
DOMINGUEZ SAYANS, J.
6268
DOMINIS, M.
6362*
DONALDSON, G.A.
6257*
DONDE, U.M.
6254
DONDELINGER, R.
6068, 6409
DONEGAN, J.H.
6418*
DONEGAN, W.L.
6418*
DONOVAN, A.J.
6065*
DONOWITZ, M.
5870, 6021
DORAN, J.
6469*
DOROSHEVSKII, I.L.
6272
DORSCH, E.R.
6098
DOSIK, H.
6430*
DOTTER, C.T.
6488
DOUGLAS, A.P.
5868
DOUTRE, L.P.
6344
DOW, T.G.B.
5874*
DOWLING, R.F.
6469*
DRAGHI, E.
5990
DRASAR, B.S.
6018*
DRAUSCHKE, W.
6046
DREILING, D.A.
6324*
DREW, S.I.
6337*
DRONOV, A.F.
6278
DROUILLARD, J.
6086
DUBE, B.
6439
DUBE, R.K.
6439
DUBIN, M.
5985
DUBOIS, A.
6074
DUBOIS, P.M.
5846*
DUBOIS, R.S.
6557*
DUDRICK, S.J.
5880*, 6240
DUHAMEL, G.
6507*
DULTSEV, I.V.
6300
DUNCOMBE, W.M.
5997
DUNN, D.H.
6190
DURBIN, R.P.
5929
DWYER, J.M.
6455*
DYCK, W.P.
6143*
DYKES, P.W.
6108
EARLAM, R.J.
6480*
EASTHAM, E.J.
5868, 6253
EASTWOOD, G.L.
5896*
EBEID, A.M.
5891, 6505*
ECKARDT, V.F.
5871*
ECONOMIDOU, J.
6426*
EDDLESTON, A.L.W.F.
6431*, 6442*, 6446
EDELL, S.
6495
EDWARDS, D.A.W.
6114
EDWARDS, V.M.
6429*
EHMS, H.
6559*
EINARSSON, K.
6365*
EISENBERG, R.L.
6202*
EL-HAWARY, M.F.S.
6532
EL-KHATIB, C.S.
6313*
EL SHEIKH, N.
6431*
EL-SHOBAKI, F.A.
6532
ELASHOFF, J.
6188, 6199*
ELIAKIM, M.
6441*, 6461*
ELIZAVETINA, G.A.
6084
ELLEFSON, D.M.
6042*
ELLER, B.C.
6004
ELLERT, M.
5927
ELLIS, F.H., JR.
6115
ENAT, R.
6422
ENGELKING, L.R.
6403, 6404
ENGEN, P.
6052
ENGLERT, E., JR.
6144*
ENGSTROM, J.F.
6319
ENKER, W.E.
6330
EPSTEIN, C.
6204*

ERDMANN, K.R.
5856*
ERLINGER, S.
5985
ERUKHIN, P.G.
6087
ESCARTIN, P.
6359*
ESCOURROU, J.
5942
ESCOURROU, J.C.
5891
ESPINER, H.J.
6187
ESPIRITU, C.R.
6186
ESSA-KOUMAR, N.
5934*
ESTRADA, R.G.
6098
ETIENNE, J.
6460*
ETIENNE, J.P.
6401
EVANGELISTA, A.
6189
EVANS, W.E.
6006*
FABBRI, R.
6179
FABRI, P.J.
6078
FALCHUK, K.
6350
FARAG, H.F.
6060*
FARBER, E.
6385
FARIA, V.
6476*
FARRELL, J.
5900*
FARRER-BROWN, G.
6221*
FASSATI, M.
6353*
FAYADH, M.
6469*
FEDOROV, B.P.
6287
FEDOROV, V.D.
6292
FEIGIN, R.D.
6519
FEINSTONE, S.M.
6427*
FELDMANN, G.
5974, 5985
FELLER, E.R.
6351*
FELSENFELD, O.
6006*
FELSING, H.H.
6149
FERLAND, L.
6005
FERNANDEZ-CRUZ, E.
6359*
FERNANDEZ-CRUZ, L.
5852
FERRETTI, J.L.
5857*
FERRUCCI, J.
6360*
FEVERY, J.
5973
FICOIAN-GREEN, R.G.
5900*
FILIPPOV, E.M.
6166
FINI, A.
6134*
FINKELSTEIN, W.
6144*
FISCHER, E.
5968*
FISCHER, J.E.
5891, 6505*
FISCHER, R.
6190
FISHER, A.A.
5913
FITZGERALD, C.
5882*
FLAGEAT, J.
6306
FLAMENT, J.B.
6238
FLANAGAN, P.R.
6029
FLATMARK, A.
6354*
FLESHLER, B.
6143*
FLETCHER, E.W.L.
6247
FLOOD, C.A.
6313*
FLOQUET, J.
5853
FLORESCU, A.
6462*
FOKIN, V.I.
6161
FOLIOT, A.
5975
FORBES, W.S.C.
6247
FURNASIERO, A.
6288
FORSTNER, G.C.
6029, 6038,
FORSTNER, J.
6038
FORTE, J.G.
5860*
FOSTER, D.N.
6057*
FOTOPOULOS, A.
6075, 6076
FOX, C.
6381, 6477*
FOX, J.
5856*
FRANCOS, A.
6092
FRANK, P.H.
6332
FRANKS, R.
6010*
FRASCHINI, P.
6288
FREDERIKSEN, H.J.
6153
FREEDMAN, A.R.
6040*
FREEDMAN, R.A.
5867
FREEMAN, H.J.
6547
FREISE, J.
6130
FRENI, G.
6175
FRESTON, J.W.
6144*
FREUND, H.
6245
FREXINOS, J.
5942
FREY, P.
6408
FRIDHANDLER, L.
6167*
FRIEDMAN, A.
6542
FRIEDMAN, H.I.
6224*
FRIEDMANN, P.
6258*
FRIMMER, M.
6000
FRITSCH, W.P.
5922
FRIZZELL, R.A.
5858*
FROLKIS, A.V.
6208
FROMONT, S.
6002
FROSNER, G.
6426*
FUJIWARA, T.
6105
FUJIWARA, Y.
6105
FULIGNATI, A.
5844*
FUNCK-BRENTANO, J.L.
6039
FUNG, W.P.
6136*
GAEDE, J.T.
6107
GALAL, O.M.
6544
GALBRAITH, R.M.
6464*
GALDABINI, J.
6360*
GALEY, W.R.
5946

GANGL, A.
6219*
GANICHKIN, A.M.
6293
GARAGLIANO, C.F.
6321
GARAGNANI, B.
6134*
GARB, J.L.
6258*
GARDIOL, D.
5969*
GAREAU, R.
6174
GARNIER C., R.
6116
GARSTEN, J.J.
6500*
GAUTIER, A.
5969*
GAVOILLE, H.
6237
GAYLER, B.W.
6356*
GAZZARD, B.G.
6256
GEBHARD, R.L.
6007*
GEIGER, H.
6231
GEIS, W.P.
6400
GELFAND, D.W.
6056*
GELFAND, M.D.
6163
GENANT, H.
6399
GERENCSER, G.A.
5859*
GERETY, R.J.
5995, 6428*
GERGELY, R.
6366*
GERHARDT, D.C.
5887
GERMAIN, M.
5851, 6223*
GERCK, W.
6378, 6379, 6448*
GHAHREMANI, G.G.
6503*
GIACOSA, A.
6215, 6228
GIBSON, R.G.
6403
GILMORE, I.T.
6407
GILSANZ, V.
6334*
GIRARD-GLOBA, A.
5957*
GIRARD, J.
5941*, 6033
GIRAULT, M.J.
6470*
GITNICK, G.L.
6320
GIUSTRA, P.E.
6493
GJONE, E.
6354*
GLASS, G.B.J.
6524
GLASS, J.L.
6567
GLEASON, W.L., JR.
6514
GLENN, F.
6492
GLICKMAN, R.P.
6014*
GLOVER, S.C.
6558*
GNAUCK, R.
6303
GO, V.L.W.
6022, 6151
GOGL, A.
5968*
GOHKBAND, C.
6151
GOLDEN, M.H.N.
6515
GOLDFARB, S.S.
6369*
GOLDSTEIN, C.A.
6527
GOLDSTEIN, F.
6246
GOLDSTEIN, M.M.
6521
GOLLAN, J.L.
637C*
GOMEZ, R.G.
6503*
GONZALES, J.G.
6103
GOOD, L.I.
6348
GOONERATNE, N.S.
6391
GORALSKI, S.A.
6049
GORBATOVA, N.E.
6278
GORDON, E.R.
6475*
GORIN, N.C.
6507*
GORSKI, L.
5918
GOTTEKER, G.S.
6017*
GOUDEAU, A.
6443*
GOUFFIER, E.
6301
GOYAL, R.K.
5872*
GRAF, J.
5983
GRAHAM, D.Y.
6098, 6102, 6126, 6144*
GRAHAM, J.M.
6444*
GRAHL, R.
6046
GRAMATICA, L.
5943
GRANGE, A.
6255
GRANGER, D.N.
6054
GRANT, B.J.
5956*
GRAY, T.A.
5895
GRECHISHKIN, D.K.
6167
GREEN, P.H.R.
6014*
GREENBAUM, L.M.
5890
GREENBERGER, N.J.
6061*
GREGUS, Z.
5968*
GREMILLET, C.
5851
GRENIER, P.
6470*
GRIBBLE, R.J.N.
6142*
GRINAUD, J.A.
5972*
GRODSINSKY, C.
6339*
GRONWALL, R.
5989
GROSSMAN, M.I.
5940*, 6199*
GRUBER, H.
5873*
GRUMET, F.C.
6520
GRUN, M.
5987
GRUNDY, S.M.
6384
GRYBOSKI, J.D.
6556*
GSCHNITZER, F.
6270
GUASTAVINO, E.
6081, 6120
GUBERNICK, I.
5964*
GUDMAND-HOYER, E.
6203*
GUEGAN, Y.
6483*
GUILLET, R.
6275
GUMUCIO, J.J.
5979
GUNNING, J.J.
6417*
GUPTA, I.M.
6551
GUPTA, R.M.
6551
GUPTA, V.K.
6551

GUSLANDI, M.
6189
GUSTAFSSON, B.E.
6044*
GUTH, P.H.
6199*
GYORFFY, A.
6205
GYR, K.
5941*, 6008*
GYR, N.
6033
HAAG, C.
6231
HAASE, W.
5929
HADI, N.A.
5937*
HADZIC, N.
6358*
HAFEZ, E.S.E.
5849
HAICKEN, B.N.
6494
HAKKILUOTO, A.
6147
HALDIMANN, B.
6541
HALL, R.A.
5855
HALLBACK, D.A.
6041*
HALTER, F.
5914
HAMDI, I.
6528
HAMILTON, B.E.
5930
HAMILTON, E.B.D.
6464*
HAMMARSTROM, S.
6044*
HAMMERMAN, A.M.
6312*
HANCHAR, A.J.
5925
HANKER, J.S.
5850
HARACA, M.
5886
HARDONK, M.J.
5977
HARDY, K.J.
6178
HARDY, T.J.
6331
HARMON, J.W.
5928, 6028
HARRINGTON, D.P.
6356*
HARRISON, R.
6106
HARRY, D.S.
6381, 6477*
HART, F.E.
5954*
HARTLEY, T.F.
5866
HARTLINE, J.V.
6535
HARTWIG, F.F.
6555
HASHEM, A.A.
6544
HAUSAMEN, T.U.
5922
HAVLICHEK, D., JR.
5900*
HAWKINS, C.F.
6108
HAWKINS, F.L.
6454*
HAYAT, M.
6513
HAYSLETT, J.P.
5864
HECHTMAN, F.B.
6364*
HECKETSWEILER, P.
5933*
HEIMSOETH, H.
6448*
HENDRIX, T.R.
6017*
HENRY, K.
6221*
HERBST, J.J.
6116
HESS, H.
6206
HESSO, A.
6476*
HEW, J.J.
5954*
HICKMAN, R.
5956*
HILL, J.H.
6555
HINES, C., JR.
6388
HIRASAWA, F.
5971*
HIRSCHOWITZ, B.I.
6403, 6404
HIRST, B.H.
5902*
HIRST, D.
6463*
HIWATASHI, K.
5883*
HO, K.J.
6491
HOARE, A.
6108
HOBSON, R.W., II
6040*
HOF, D.G.
6555
HOFBAUER, F.
5921
HOFFER, P.B.
6059*
HOHNKE, L.A.
6198
HOLDER, T.M.
6128
HOLLAND, P.V.
6429*
HOLLANDER, D.
5863*
HOLM-BENTZEN, M.
5992
HOLME, R.
6354*
HOLMES, J.H.
6233
HOLMES, R.
6010*
HOMAN, W.P.
6560*
HOMER, D.R.
6546
HONDA, R.
5883*
HONOUR, P.
6259*
HOOFNAGLE, J.H.
6429*
HOREJSI, J.
6353*
HORKY, J.
5993
HORNYCH, A.
6244
HORTON, L.W.L.
6561*
HOUDELETTE, P.
6344
HOUSSET, E.
6244
HOUSTON, H.
6018*
HOVIG, T.
6354*
HOWARD, R.J.
6190
HSU, S.C.
6491
HUANG, C.T.L.
6504*
HUBBARD, T.B., JR.
6225*
HUBER, J.
6529
HUCHZERMEYER, H.
6130
HUGHES, W.
6181, 6193
HUMPHREYS, W.G.
6152
HURTUBISE, P.E.
6506*
HURWITZ, R.
6255
HUTSON, D.
5937*
HYMES, J.L.
6494
IAITSKII, N.A.
6293
IBRAHIM, A.
6532
ICHINOE, A.
6453*

IGARASHI, M.
6453*
IHAMAKI, T.
6154, 6155
IICA, M.
6243
IKEDA, M.
5903*
IMAI, M.
6435*
IMARISIO, J.J.
6351
IMONDI, A.K.
6008*
IMRIE, C.W.
6241
INFANTE, R.
5975
IRI, F.
6484
IRONS, H.S., JR.
6074
IRVING, M.
6234
ISAEV, N.M.
6171
ISAEV, V.P.
6084
ISHIDATE, T.
6105
ISHII, T.
6484
ISOKOSKI, M.
6155
ISSERLEF, H.
5998
ISUPOV, I.V.
6036
ITO, Y.
6332
ITOH, H.
6243
ITOH, S.
6453*
ITOH, Z.
5883*
ITOTIA, J.N.
6502*
IVANCHO, E.S.
6218
IVANOV, V.V.
6084
IVANOVA, A.S.
6308
IVANOVA, E.A.
6211
IVEY, K.J.
5845*, 5888, 6180
IWAKIRI, S.
6435*
IWATSUKI, S.
6400
IYNGKARAN, N.
6251*
JABLONSKI, P.
5962*
JACOB, G.B.
6432*
JACOBI, E.
6559*
JACOBS, W.H.
6121
JAKESZ, R.
5921
JAMES, E.C.
6518
JAMES, E.M.
6318*
JAMES, H.F.
6048
JANOWITZ, H.D.
6315*
JAQUES, D.A.
6545
JARHULT, J.
6055
JARVI, C.F.
6185
JAWAREK, J.
5939*
JEKEL, P.A.
5977
JENKINS, D.J.A.
6018*
JENSEN, K.B.
6203*
JEZKOVA, Z.
6353*
JHAVERI, R.
6430*
JIVRAJ, T.
6018*
JODAL, M.
6041*
JOFFE, B.
6337*
JOFFE, S.N.
6241
JOHANSEN, I.S.
6153
JOHNSON, A.G.
6104
JOHNSON, D.G.
6116
JOHNSON, G.M.
6026
JOHNSON, J.E.
6255
JOHNSON, L.F.
6141*
JOHNSON, L.R.
5910*, 5931
JOHNSON, P.
5953*
JOKY, A.
5972*
JOLLEY, S.G.
6116
JONES, E.A.
6405*
JONES, R.
6523
JUDELMAN, J.
6204*
JUNGE, U.
5938
JURINE, J.P.
6298
JUST, H.
6487
KADAGIDZE, Z.G.
6032
KADUSHEV, B.K.
6161
KAHN, R.A.
6429*
KAKIZAKI, G.
6105
KAL'TER, I.S.
6283
KALAPESI, Z.
6248*
KALIMA, T.V.
6097, 6147
KAMENEVA, S.I.
6085
KAMINSKAYA, G.A.
6165
KAMINSKY, D.C.
6502*
KAN, C.
6105
KANG, J.Y.
6108
KAPIKIAN, A.Z.
6502*
KARAYALCIN, G.
5964*
KASPER, W.
6487
KATHER, H.
5904*
KATO, E.
6105
KATON, R.M.
6488
KATZ, D.
6127
KATZ, M.
6095
KAYASSEH, L.
5941*, 6033
KAZAM, E.
6006*
KEALY, J.K.
6051
KEARSLEY, M.W.
6050
KEATING, J.P.
6519
KEIDING, S.
5965*, 5976
KEITH, L.N., JR.
6006*
KEITH, R.G.
6510
KEKKI, M.
6155
KELLER, F.S.
6488
KELLY, J.D.
5997

KELLY, K.A.
6154
KELLY, P.A.
6005
KELVIN, F.M.
6340*
KENNEDY, P.A.
6371*
KENYON, G.S.
5905*
KEONIA, Y.
6077
KERA, K.
6457
KERR, J.C.
6040*
KERREMANS, R.
6291
KEUNTJE, H.
6093
KHODZHIMETOV, A.K.
6158
KIBRICK, S.
6047
KIBRITE, A.
6289
KILLINGLEY, M.
6020*
KILLORAN, P.J.
6493
KIRWAN, W.O.
6536
KISS, B.
6205
KLAPDOR, R.
6001
KLAVINS, J.V.
6471*
KLIMENKOV, A.A.
6161
KLOPPEL, G.
6001
KLUGE, J.P.
6051
KNOBLAUCH, M.
6408
KOELZ, H.R.
6206, 6214
KOLARIC, K.
6362*
KOLCDEJ, A.
5876*
KOLCNTAROV, I.S.
6283
KOMAROV, G.D.
6168
KONTUREK, S.J.
5939*, 6019*, 6201*
KOPLATADZE, A.M.
6307
KORELITZ, B.I.
6567
KORMAN, D.B.
6171
KORNEEV, A.I.
6284
KORSHAK, A.L.
5917
KOSACHENKO, F.A.
6292
KOSAREV, V.A.
6164
KOSTIC, S.
6366*
KOTHARY, P.
5900*
KOUBA, K.
6267
KOUTOULIDIS, C.
6075, 6076
KOVDAD, A.
6207
KOWALEWSKI, K.
5876*
KOZLOWSKI, J.M.
6242
KRAG, E.
6203*
KRAJCZAR, G.
6205
KRAUS, J.F.
6064*
KRAUSE, W.J.
5845*, 6180
KRAVITZ, J.J.
5875*
KREISLER, M.
6359*
KRENTZ, K.
6151
KRESSEL, H.Y.
6059*, 6566
KREULEN, D.C.
6194
KREUZER, W.
6295
KRIER, J.
5881*
KRISHNAMURTHY, V.
6004
KRISTENSEN, E.
6322
KROHN, K.A.
6064*
KRON, B.
5958*
KRUSS, D.M.
6144*
KUMAR, V.
6536
KUMMERLE, F.
6305
KUPFER, A.
5985, 6541
KUPPER, R.
6132
KURAHACHI, H.
5903*
KURGUZOV, G.P.
6171
KURTZ, R.C.
6540
KUTZ, K.
5973
KUZ'MICHEV, I.A.
6277
KVETNOY, I.M.
6032
KWIECIEN, N.
6201*
KYUSOLA, K.
5884
LAATIKAINEN, T.
6476*
LABAYLE, D.
6309, 6401
LABIANCA, R.
6288
LABIB, L.A.
5902*
LABRIE, F.
6005
LADWIG, S.H.
6072
LAM, S.K.
6251*
LAMARQUE, J.L.
6008, 6094, 6409
LAMBERT, R.
6137*
LAMERS, C.B.
6509*
LANCASTER, C.
5925
LANDAY, S.E.
6387
LANDOR, J.H.
5897*
LANDRES, R.T.
6182
LANGER, K.H.
6487
LANGER, S.
6271
LANUZA, A.
6539
LANZA, F.L.
6124
LANZKOWSKY, P.
5964*
LAPIERRE, J.
6223*
LAQUE, R.
6414
LARDENNOIS, B.
6238
LARDEUX, B.
5957*
LARSEN, S.A., JR.
6540
LARSON, H.E.
6259*
LARSON, K.
5898*
LATASTE, J.
6483*
LAURENT, J.
5853
LAVERGNE, G.M.
6048
LAWS, J.W.
6363*

LAZAR, G.
5954
LEAHY, J.
5899*
LEBLANC, G.
6005
LEBREC, D.
6355*
LEBWOHL, O.
6313*, 6445*
LECOMPTE, P.M.
5871*
LECOMTE, P.
6237
LEDERMAN, H.M.
6383
LEE, E.
6247
LEE, F.D.
6241
LEE, K.H.
6326*
LEE, W.M.
6445*
LEFRAK, S.S.
6459*
LEHR, L.
5921
LEHTOLA, J.
6155
LEHTONEN, P.
6476*
LEHY, T.
6262*
LEIJD, B.
6365*
LEMAIGRE, G.
6223*
LEMERCIER, Y.
6301
LENRIOT, J.
6223*
LEPIORZ, H.
6379
LEPORSKII, V.N.
6160
LESCOEUR, N.
6302
LETYAGIN, V.P.
6161
LEVENSON, S.M.
5951*
LEVIN, B.
6323
LEVINE, R.A.
6192
LEVINE, S.E.
6054
LEVY, C.
6296
LEWIS, C.D.
5928
LICASTRO, R.
6120
LICHTENBERGER, L.M.
5931
LICKLEY, H.L.A.
6043*
LIE, J.T.
6056
LIEBER, C.S.
6449*
LIEBERMANN, T.R.
6143*
LIEBMAN, P.F.
6364*
LIEBMAN, W.P.
6542
LIEHR, H.
5987
LIEM, F.H.
6384
LIFSHITZ, F.
5855*
LIGUMSKI, M.
6481*
LILIENFELD, A.M.
6321
LIM, R.C.
6371*
LINDBLAD, B.S.
6531
LINDEMANN, M.
6149
LINDENBAUM, J.
6516
LINDENBERG, J.
6474*
LING, V.
6024
LINHART, P.
6299
LIOR, F.
6048
LISITSKII, A.N.
6162
LISKER, R.
6416
LLANOS, O.L.
6019*
LOBLEY, R.W.
6010*
LOCK, M.R.
6372
LOIKO, E.E.
6281
LOIUDICE, T.A.
5862*, 6420*
LOKHVITSKII, S.V.
6287
LONG, W.B.
6348
LORECK, J.
6093
LORENZ, D.E.
6427*
LORIA, R.M.
6047
LOSA, G.
5952*
LOSEV, Y.A.
6168
LOSOWSKY, M.S.
6057*
LOUIS, A.
5942
LOUIS, D.
5972*
LOVE, A.H.G.
6152
LOWRY, S.F.
5898*, 5906*
LUCHETTA, L.
6179
LUDERS, L.
6146
LUEY, K.
6436
LUKENS, D.
6389
LUKINYKH, A.K.
6159
LUNDGREN, O.
6041*
LUPORINI, G.
6288
LUQUE GONZALEZ, M.T.
5911
MACARONE-PALMIERI, R.
6016*
MACHEN, T.E.
5860*
MACHOVER, D.
6513
MACK, D.V.
6117
MACKERCHER, P.A.
5845*, 6180
MADDING, G.F.
6371*
MADDREY, W.C.
6357*, 6466*
MADGE, G.E.
6331
MADSEN, D.C.
5961*
MAETA, T.
6125
MAGOS, L.
5960*
MAHADEVAN, R.
6220*
MAIER, K.P.
6379, 6448*
MAKHACHEV, M.O.
6035
MAKHLOUF, G.M.
5909*
MALAGELADA, J.R.
6022, 6023, 6191
MALAGUTI, P.
6134*
MALCHOW, H.
6213
MALINOVSKII, N.N.
6104
MALKERCVA, N.N.
6084
MALT, R.A.
5996, 6015*, 6360*
MANABE, T.
6235

MARGOLIS, S.
6013*
MARGULIS, A.R.
6202*
MARIANO, E.C.
5857*
MARINELLI, R.
5844*
MARKIEWICZ, K.
5918
MARKS, J.W.
6482*
MARQUARDT, H.
6184
MARROCCO, G.R.
6550
MARSHALL, J.J.
5944
MARSHALL, R.
6519
MARTEL, W.
6111
MARTIN, E.D.
5851, 6239
MARTIN, E.W., JR.
6006*
MARTIN, J.F.
6485
MARTIN, L.
6452*
MARTIN, M.
6289
MARTIN, R.
6413
MARTIN, W.C.
6058*
MARTINEAU, C.
6048
MARTINI, E.R.
6081
MARWAH, S.P.
6551
MARZOLI, G.P.
6342
MASELLI, M.G.
6179
MATHE, G.
6513
MATHER, G.H.
6187
MATOLO, N.P.
6064*
MATSESHE, J.R.
6023
MATSUKURA, S.
5903*
MATSUMOTO, T.
5899*
MATUCHANSKY, C.
6139*
MATVEEV, I.V.
6272
MATZ, L.R.
6136*
MATZKIES, F.
6176
MATZUDA, H.
6009*
MAUPAS, P.
6443*
MAURICE, M.
5985
MAYS, E.T.
6375
MAYUMI, M.
6435*
MCADAM, W.A.F.
6157
MCCORMACK, L.R.
6384
MCCUNE, B.R.
6485
MCCUSKEY, P.A.
5847*
MCCUSKEY, R.S.
5847*
MCDERMOTT, W.V., JR.
6467
MCDOWELL, D.E.
6516
MCFARLANE, I.G.
6446
MCGEENEY, K.F.
5382*
MCGUIGAN, J.E.
6078
MCINTYRE, N.
6377, 6381, 6477*
MCLEAN, D.M.
6517
MCLEISH, A.R.
6178
MEARS, G.A.
6198
MEDLINE, A.
6385
MEHTA, A.I.
6518
MEIJER, D.K.F.
5977
MEIJERS, K.A.F.
6317*
MEINERTZ, T.
6487
MEKHJIAN, H.S.
6506*
MENDELOFF, A.I.
6321
MENGATO, L.
5990
MENGE, H.
6016*
MENZIES, I.S.
6250*
MERKLE, P.
6148
MERSON, M.
6504*
MERYMAN, H.T.
6429*
MESHKINPOUR, H.
6188
MESSORI, D.A.
6246
MESTRES, H.M.
6514
METGES, P.J.
6306
METWALLI, G.M.
6544
MEUWISSEN, S.G.M.
6316*, 6317*, 6562*
MEYERS, M.A.
6508*
MEYERS, S.
6315*
MICHAELS, J.E.
6011*
MICHALOPOULOS, G.
5950*
MICHEL, H.
6094
MIDDLETON, P.J.
6529
MIDGLEY, R.C.
6073
MIGLIOLI, M.
6197
MIGUEL VELASCO, J.E.
6268
MILLER, B.
6559*
MILLER, D.L.
5979
MILLER, R.
6030
MILLER, T.A.
6019*
MILLS, J.G.
6108
MILOSZEWSKI, K.J.A.
6057*
MILSOM, J.P.
6405
MINNIGERODE, B.
6132
MINTZER, R.A.
6083
MIRKOVITCH, V.
6016*
MIRZOIAN, S.A.
6216
MISSET, J.L.
6513
MISSIRIAN, A.
6383

MITCHELL, C.H.
6255
MITCHELL, M.E.
6227
MITCHELL, P.D.
6564
MITCHELL, W.T., JR.
6388
MITSUNO, T.
6411
MIYAKAWA, Y.
6435*
MIYAZAKI, K.
6229
MODIGLIANI, E.
6301
MOGILEVSKAIA, K.A.
6281
MOHANRAM, M.
6526
MOLDENHAUER, W.
6264
MOLINARI, F.
6215
MONCO-BRUCA, P.
6232
MONTGOMERY, C.K.
6059*
MONTINARI, F.
6288
MOODY, F.G.
5858*
MOORE, E.W.
6027
MORGAN, A.G.
6157
MORGAN, K.G.
6194
MORGAN, M.Y.
6405, 6450*
MORIN, C.L.
6024
MOROZOV, I.A.
5919
MORRIS, W.
6045*
MORRISON, S.A.
6451*
MORRISSEY, J.F.
6122
MOSBECH, O.
6322
MOSCHL, P.
6295
MOSHAL, M.G.
5874*
MOSIMANN, F.
6016*
MOSLEY, J.W.
6425*
MOSS, A.A.
6059*, 6202*, 6566
MOTT, M.
6428*
MOULINIER, B.
6137*
MOUSSOUROS, A.
6442*
MOWAT, N.A.G.
6558*
MUDAROV, M.S.
6287
MUELLENER, C.
5952*
MUGNETSYAN, V.A.
6089
MULLER-EBERHARD, U.
6384
MUNTHE-KAAS, A.C.
5945*
MURALIDHARA, K.S.
5863*
MURAT, J.E.
6236
MURISON, J.
5903*
MURPHY, J.
6465*
MURPHY, R.A.
5893
MURRAY-LYON, I.M.
6368*
MURRAY, P.C.
5891, 6505*
MUTCHNICK, M.G.
6383
MYASNIKOV, A.D.
6345
N'GUYEN, R.
6260*
NAFTEL, J.C.
6403
NAGAI, N.
6058*
NAGARAJA, M.R.
6200*, 6338*
NAHUM, P.
6470*
NAJMAN, A.
6507*
NAKAMURA, S.
6457
NANGIA, B.S.
6226*
NASSAR, V.H.
6222*
NATELSON, B.H.
5930
NAVEH, Y.
6542
NAYUDU, P.R.V.
6012*
NAZARETIAN, R.A.
6216
NEIMAN, M.L.
6083
NEMETH, P.R.
6025
NEMETH, T.J.
6224*
NEMILOVA, T.K.
6272
NEVALAINEN, T.J.
5935*, 6185
NEZAMIS, J.E.
5925
NICHOLAS, A.W.
6373
NICHOLLS, R.J.
5932, 5986
NICHOLS, B.L.
6504*
NICOTRA, I.
6034
NIELSEN, L.M.
6474*
NIELSEN, S.P.
6474*
NIKITIN, A.M.
6307
NILIUS, R.
6406
NIWA, M.
6328
NOLAN, D.J.
6247
NOUSIA-ARVANITAKIS, S.
6061*
NUGYN, V.C.
6082
NURMUKHAMEDOV, R.M.
6169
NUSINOVICI, V.
6382
O'BRIEN, T.F., JR.
6465
O'CONNELL, D.J.
6261*
O'CONNOR, P.J.
5862*
O'GRADY, L.R.
6117
OAKS, E.V.
6451*
OBTULOWICZ, W.
6201*
OCKNER, R.K.
5980
ODARIUK, T.S.
6269, 6292
ODES, H.S.
5938*
ODUM, S.K.
6224*
OGAWA, K.
6385
OGOSHI, K.
6328
OGUNBA, E.O.
6554
OGUNBI, O.
6552
OHIZUMI, T.
6105
OHKUMA, R.
6229
OHSATO, K.
6243
OHYANAGI, H.
6411

OKRASINSKI, H.
6394
OLAND, Y.
6479*
OLEKSY, J.
6201*
OLSEN, W.R.
6421*
ONSTAD, G.
6190
OP DEN ORTH, J.C.
6196
OPOLON, P.
6382
OPPEL, W.C.
6082
OPPENHEIMER, E.H.
6329
ORNSHOLT, J.
6150
ORTIZ, J.
6120
ORTIZ, J.P.
6081
OSMAN, C.G.
6431*
OTEYZA, C.P.
6334*
OTTENJANN, K.
5920
OTTO, L.
6406
OVERBY, L.R.
6425*
OWEN, J.S.
6377, 6381
OWEN, O.E.
5934*
OYERINDE, J.P.O.
6552
PACE, O.T.
6258*
PACE, W.G.
6006*
PACSOC, C.
6157
PADDACK, G.L.
5910*
PAILLER, J.L.
6306
PAKHOMOVA, G.V.
6168
PALMA, K.
5959*
PALMER, D.
5907*
PALOYAN, O.
6333*
PANDEY, L.K.
6439
PANGARO, J.A.
6120
PAPADIMITRIOU, J.
6075, 6076
PAPAEVANGELOU, G.
6426*
PAPE, K.
6056*
PARADA HERRERO, R.
6268
PARADINAS, F.J.
6368*
PARAKHONYAK, V.I.
6160
PARCHA, S.
6420*
PARENT, K.
6564
PARK, W.C.
6256*
PARKE, D.V.
5848
PARKHOMENKO, I.G.
6284
PARKS, T.G.
6152
PARMEGGIANI, A.
6150
PASHINIAN, S.A.
6274
PASSATI, P.
6353*
PATERSON, I.D.
6534
PATTEN, M.T.
6364*
PAULIN, C.
5846*
PAUMGARTNER, D.
5952*
PAUMGARTNER, G.
6352*, 6423
PAUNIER, L.
5894
PEACE, R.J.
6454*
PEARSE, A.G.E.
5885
PECK, C.C.
6224*
PEDERZOLI, P.
6342
PELKONEN, R.C.
6447*
PELLEGRINI, C.A.
6141*
PELLERIN, C.
6262*
PELLONI, S.
6206, 6214
PELOT, D.
6067*
PENA R., A.
6116
PENCHAS, S.
6441*
PENG, S.K.
6420*
PENA, A.
6499*
PERA, C.
5852
PEREIRA, A.A.
6276
PEREIRA, J.N.
6198
PEREZ-CANDELA, V.
6539
PERISSAT, J.
6344
PERLMANN, P.
6044*
PERNOT, F.
6344
PESSAYRE, D.
5974
PETERNEL, W.W.
6501*
PETERS, H.
6271
PETERS, T.J.
6415*
PETERSEN, H.
5940*
PETERSEN, O.H.
5895
PETERSON-DAHL, E.
5996
PETITE, J.P.
6244
PETRENKO, V.M.
6177
PETRIC, M.
6529
PETRONIO, R.
6342
PETROV, V.P.
6290
PETTIT, J.
6373
PETZINGER, E.
6000
PEZZI, A.
6265
PFISTER, R.C.
6227
PFLUG, B.
6006*
PHILIPPE, O.
6275
PHILLIPS, J.F.
6065*
PHILLIPS, P.J.
6062*
PHILLIPS, S.F.
6023
PICHLMAYR, R.
6145
PICKLEMAN, J.R.
6490
PICOU, D.
6515
PIERCEY, J.R.A.
6042*, 6547
PIMPARKAR, B.D.
6254
PINALS, R.S.
6192
PIRTTIAHO, H.I.
6447*
PITCHUMONI, C.S.
6127
PITKANEN, U.
6447*

PITOT, H.C.
5950*
PITTENGER, G.
5900*
PIUBELLO, W.
6342
PIZZO, S.V.
6340*
PLENAT, F.
5853
PODOLSKY, T.L.
5966*
POHL, A.
6413
POLAK, J.M.
5869
POLGE, O.
6068
POLIAK, K.I.
5913
POLLETT, J.M.
6195
POLONOVSKI, J.
6460*
POMELOV, V.S.
6171
PONKA, J.L.
6339*
PONOMARENKO, S.P.
6170
POPOVA, Z.P.
6085
POPPER, H.
6398
PORT, R.B.
6508*
PORTMANN, B.
6442*
POSNER, D.B.
6452*
POSTEN, L.
6380
POULIADIS, G.
6408
POUYET, M.
6302
POWELL, D.W.
6138*
POYNARD, T.
6309
PRABHAVATHI, P.
6526
PRAHARAJ, K.C.
6537
PREISIG, R.
5989, 6352*
PRESENT, D.H.
6567
PRICE, A.B.
6259*
PRIEST, R.J.
6144*
PRIMICH, E.I.
6218
PRIVETT, J.
6167
PROBST, P.
6473*
PROTASEVICH, A.A.
6307
PUCCI, A.
6314*
PUCHE, R.C.
5857*
PUCHETTI, V.
6342
PULMANC, C.M.
6327
PUPPALA, A.R.
6341*
PURCELL, R.F.
6427*
PUTHUCHEARY, S.D.
6251*
PUTNEY, J.B., JR.
5865
PUTZ, R.
6270
RABISCHONG, P.
6068
RADER, G.
6422
RADOMSKY, J.
6146
RAFES, I.E.
6031
RAHBEK, I.
6203*
RAIKHLIN, N.T.
6032
RAKELA, J.
6425*
RAMBAUD, J.C.
6139*
RAMSAY, D.M.
6433*
RANSON, J.F.C.
6335*
RASENACK, U.
5987
RASK-MADSEN, J.
6203*
RAYFORD, P.L.
5901*, 6019*
REBOLLAR, J.L.
6334*
RECHARDT, L.
5884
REDDY, V.
6526
REDEKER, A.G.
6425*
REDFORS, S.
6041*
REED, J.C.
5902*
REES, J.P.R.
6248*
REID, C.P.
6062*
REID, L.
6525
REILLY, F.D.
5847*
REINO, D.
5998
RENAUD, G.
5975
RENE, E.
6212
RENNER, F.
6219*
REUBI, F.
6541
REYNTJENS, A.
5878*
RHODES, C.
6142*
RIBERA, M.T.
5943
RIBET, A.
5942
RICCI MACCARINI, P.
6265
RICCI, P.
6179
RICE, R.P.
6340*
RICHARDSON, C.J.
6136
RICHTER, J.A.
6192
RIDDELL, R.H.
6323
RIEDLER, L.
6270
RIGBERG, L.A.
6458
RIGBY, R.J.
6136*
RINDERKNECHT, H.
6200*, 6338*
RING-LARSEN, H.
5992
RISING, P.A.
5953*
RITTMANN, R.W.
5941*
RIVES, J.
6238
RIZZETTO, M.
6499*
ROBBERECHT, P.
6410
ROBERT, A.
5925
ROBERTS, R.B.
6512
ROBERTS, W.H.
6052
ROBERTSON, A.G.
6241
ROBINSON, J.W.L.
6016*
ROBINSON, M.J.
6251*
ROBLES, G.
6416
RODGERS, J.B.
5862*
ROGERS, L.F.
6109, 6521
ROLLES, D.J.
6249*

ROMANOV, V.S.
6412
ROMANOVICZ, D.K.
5850
ROMMELBURG, H.P.
6050
ROOT, J.A.
6493
ROSCH, J.
6488
ROSEN, V.J.
6320
ROSENBERG, I.M.
6563*
ROSENSTEIN, B.J.
6329
ROSOFF, L.
6402
ROSOFF, L., JR.
6402
ROSS, J.S.
6015*
ROSS, P.E.
5963*
ROTH, A.
6362*
ROTHSCHILD, J.
6557*
ROTZSCH, W.
6413
ROUFAIL, W.M.
6113
ROUMELIOTOU, A.
6426*
ROWDEN, D.K.
6192
ROWLAND, K.
6062*
ROZE, C.
6118
RUBIN, J.
5874*
RUDOWSKI, W.J.
6049
RUEFF, B.
6355*
RUFEGER, U.
6000
RUITENBERG, E.J.
6549
RUIZ, K.
6077
RUMBLE, W.F.
6465*
RUNE, S.J.
6203*
RUNGE, P.M.
6497
RUSSELL, K.M.
6451*, 6452*
SABESIN, S.M.
6454*
SABOV, V.A.
6218
SABRA, A.
6557*
SACHAR, D.B.
6315*
SACK, D.A.
6502*
SACK, R.B.
6502*, 6530
SADOVNICHII, V.A.
6269
SAGAWA, A.
6319
SAGEEVA, C.F.
6036
SAGER, G.F.
6220*
SAID, A.
6532
SAID, S.I.
5905*
SAIDE, J.D.
5893
SAILER, D.
6176
SAITO, M.
6009*
SAKHAROVA, E.V.
6286
SAKR, R.
6532
SALAMOV, K.A.
6300
SALEM, A.A.
6222*
SALEM, P.A.
6222*
SALERA, M.
6197
SALES, D.J.
6330
SALKHANOV, E.A.
6217
SAMLOFF, I.M.
6154
SAMOURIAN, S.
6370*
SAMSON, E.I.
6210
SANDLER, S.G.
6441*, 6461*
SANDSTEAD, H.H.
6563*
SANKARAN, H.
5882*
SANTINI, E.
6499*
SARLES, H.
5936*
SARLES, J.
6260*
SATO, K.Y.
6276
SATO, T.
6457
SATTLER, C.A.
5950*
SATTLER, G.L.
5950*
SAVAGE, A.
6496
SAWMA, J.T.
5998
SCHAFFNER, F.
6398, 6424
SCHAFMAYER, A.
5901*
SCHAINKER, B.A.
6459*
SCHALLY, A.V.
5939*
SCHALM, S.W.
5981
SCHEBALIN, M.
5909*
SCHEIN, C.J.
6494
SCHERER, K.
6001
SCHERRER, S.
6541
SCHEUER, P.J.
6440*, 6450*
SCHIER, J.F.
6049
SCHIESSEL, R.
5921
SCHIFF, E.
6079
SCHLAG, P.
6148
SCHLICK, W.
6295
SCHMALZ, P.F.
6194
SCHMITT, W.
6279
SCHNEIDER, P.
5894
SCHNEURMAN, D.
6301
SCHNYDER, W.
6092
SCHOENFIELD, L.J.
6482*
SCHRAGER, R.
6465*
SCHROEBLER, S.
6481*
SCHULTE, A.
5973
SCHWARTZ, D.J.
6459*
SCHWARTZ, J.N.
6497
SCHWARTZ, M.K.
6070
SCHWARZENBERG, L.
6513
SCIARRETTA, G.
6134*
SCOBIE, W.G.
6538
SCOTT, J.
6370*
SCRATCHERD, T.
5937*
SEELIG, H.P.
5987
SEELIG, R.
5987

SEFTEL, H.
6337*
SEGOVIA DE ARANA, J.P.
6359*
SEIDEL, K.
6273
SEIF, R.M.
6486
SEIFERT, E.
6472*
SEIGLER, H.F.
6497
SEINO, S.
5903*
SEINO, Y.
5903*
SEKITA, M.
6411
SEKIYA, S.
5994
SENAC, J.P.
6068
SENGUPTA, K.P.
6511
SEPEHR, H.
6001
SERANTONI, C.
5844*
SEVERIN, C.
5959*
SEVOSTIANOV, S.I.
6294
SEWING, K.F.
6213
SEYMOUR, C.A.
6415*
SHABOT, M.
6193
SHAFFER, E.A.
6475*
SHAHID, M.J.
6222*
SHAKIR, K.M.M.
6013*
SHAPIRA, N.
6140*
SHATZ, B.A.
6312*
SHCHERBATENKO, M.K.
6166
SHCHETKA, M.P.
6218
SHEKHVATOV, L.D.
6282
SHELBURNE, J.D.
6497
SHELEKETINA, I.I.
6031
SHELLITO, P.C.
5996
SHERLOCK, P.
6540
SHERLOCK, S.
6370*, 6373, 6396, 6405, 6450*
SHERMAN, J.H.
6487*
SHIELDS, R.
6468
SHINDE, S.R.
6392
SHINOZAKA, Y.
6484
SHIRAZI, K.K.
6107
SHNEERSON, J.M.
6256
SHNITKA, T.K.
6547
SHORT, W.F.
6347
SHORTER, R.C.
6358*
SHOUVAL, D.
6441*
SHUCK, T.
5887
SIEGAL, B.
6479*
SIGEL, A.
6297
SILEN, W.
5860*, 6140*
SILVER, T.M.
6533
SILVERMAN, A.
6557*
SILVERMAN, M.S.
5850
SILVERSTEIN, F.E.
6042*
SILVIS, S.
6190
SIMMONS, A.V.
6157
SIMON, B.
5904*
SIMONIS, G.
6149
SIMONOWITZ, D.A.
6330, 6333*
SIMONYI, I.
6310
SIMOONS, F.J.
6255
SINATRA, F.R.
6255
SINGER, F.
6337*
SINGH, M.
5970*
SINGH, V.N.
5970*
SINHA, V.N.
6439
SIPES, I.G.
5966*, 5967*
SIPPONEN, P.
6155
SIRCAR, B.
5931
SITO, E.
6201*
SIURALA, M.
6154, 6155
SIZONENKO, P.C.
5894
SKILLMAN, J.J.
6140*
SKINNER, D.B.
6141*, 6332
SKLYANSKAYA, O.A.
6171
SLOMIANY, B.L.
6524
SLOWIK, F.
6090
SMAGIN, V.G.
6084
SMIRNOVA, T.V.
6308
SMITH, A.
6442*
SMITH, A.N.
6538
SMITH, F.R.
6451*
SMITH, G.W.
6082
SMITH, J.F.
6114
SMITH, L.H., JR.
6399
SMITH, M.
6106
SMITH, R.L.
6138*
SNAPE, W.J., JR.
5875*, 6263*
SNOWDEN, R.
5960*
SNYDER, N.
6455*
SOBOLEV, A.A.
6285
SOKOLOV, A.V.
6032
SOKOLOV, L.K.
6084
SOLBERG, L.A., JR.
5927
SOLER, K.P.
5854
SOLETO SAEZ, E.
6268
SOLOMON, T.
5940*
SOLOMONS, N.W.
6503*
SOLT, D.
6385
SOMOVA, E.P.
6208
SONNENBERG, A.
6206
SORONDO, J.M.
6186
SOTANIEMI, E.A.
6447*
SOTNIKOV, V.N.
6087
SPECH, H.J.
6380

SPENCER, F.C.
6335*
SPENNEY, J.C.
6403
SPIRO, H.M.
6550*
STADALNIK, R.C.
6064*
STADIL, F.
6509*
STALDER, G.A.
5941*, 6033, 6304
STANZANI, S.
6034
STEIN, J.A.
6313*
STEINFEHER, F.J.
6341*
STEINMAN, T.I.
6140*
STENGER, R.J.
6357
STEPANOV, E.A.
6278
STERICFF, S.
6082
STEWART, H.
6188
STOL, H.J.
5981
STRAHOVSKY, P.
6542
STRANG, G.I.
6187
STREKALOVSKII, V.P.
6266
STROHMANN, G.
6091
STROHMEYER, G.
5980, 6559*
STRUM, W.B.
6182, 6384
STURDEVANT, R.A.L.
6188
STURGESS, J.
6038
STURM, J.
6129
SUAREZ DE LA TORRE, G.I.
6416
SUAREZ GARCIA-SAMPEDRO, F.
6268
SUDO, M.
6009*
SUDOH, M.
6484
SUFIAN, S.
5899*
SUGIMACHI, K.
5899*
SULLIVAN, M.A.
6263*
SUMITHRAN, E.
6251*
SUMMERSKILL, W.H.J.
6358*
SUND, R.B.
5861*
SUNDARAM, S.G.
6013*
SUNDBLAD, G.
6044*
SUPALA, K.
6297
SUSHKO, V.I.
6277
SUSMAN, N.
6312*, 6459*
SUTTON, A.L.
6527
SVIRIDOV, N.K.
6085
SWAMINATHAN, R.
5856*
SWAN, K.G.
6040*
SWEETING, J.G.
6313*
SWIERCZEK, J.S.
5901*
SYMONS, A.M.
5848
SZCZEPANIK, A.B.
6049
SZURSZEWSKI, J.H.
6194
SZYDLOWSKI, T.
6246
SZYMANSKI, M.T.
6529
TABOR, E.
5995, 6428*, 6429*
TAKAHASHI, K.
6435*
TAKEMOTO, T.
6119
TAKEZAWA, Y.
6457
TALKE, H.
6448*
TALL, A.R.
6014*
TANNER, E.
6273
TARNAWSKI, A.
5888
TARUGI, P.
5991
TASLER, J.
5939*
TATEVOSIAN, G.T.
6280
TAUB, R.N.
6315*
TAVERNIER, J.
6086
TAYLOR, A.E.
6054
TAYLOR, I.L.
6192
TAYLOR, T.V.
6156
TAYLOR, W.F.
6358*
TEDESCO, F.J.
6099
TEICHBERG, S.
5855*
TEICHMANN, R.K.
5901*
TEJANI, A.
6226*
TELANDER, R.L.
6194
TERBLANCHE, J.
6395
TERNBERG, J.L.
6519
TERPSTRA, O.T.
5996
TERRY, B.
6180
TESTONI, P.A.
6189
TEXTER, C., JR.
6058*
THOMAS, E.
6127
THOMAS, M.
6480*
THOMPSON, A.J.
6261*
THOMPSON, J.C.
5901*, 6019*
THOMPSON, J.E.
6419*
THOMPSON, R.P.H.
6407
THOMPSON, W.M.
6340*
THOMSON, A.B.R.
5869
THOMSON, W.O.
6241
THORNTON, J.J., III
6246
THULIN, A.
6055
TIKHOMIROV, G.K.
6161
TIOTTO, R.
6175
TITTOBELLO, A.
6189
TJEN, H.S.L.M.
6071
TOCCALINO, H.
6081
TOMITA, T.
6080
TONNESEN, K.
5992
TOCULI, J.
5962*
TORRANCE, B.
6156
TOUNTAS, C.
6076
TRACK, N.S.
6043*
TRAP-JENSEN, J.
6474*
TREBOUX, M.
6302

TRENCHEV, P.
6136*
TREWBY, P.N.
6363*
TREY, C.
6350
TRONNIKOV, A.T.
6345
TRONNIKOVA, V.I.
6345
TROUT, H.H., III
5928
TSCHAPARGANE, C.
6231
TSENG, A.
6330
TSIMMERMAN, I.S.
6209
TSUKADA, Y.
6453*
TURBA, E.
6134*
TURELLO, V.
6215
TURJMAN, N.
6017*
TURNHEIM, K.
5858*
TURUNEN, M.
6147
TUTTON, P.J.M.
6037
TYLER, T.
5859*
TYTGAT, G.N.J.
6096*, 6131, 6316*, 6317*, 6562*
UDAKA, M.
6325*
UDALL, J.N.
6504*
UEKUSA, M.
6080
UFBERG, M.H.
6458
UKKONEN, P.
6434*
ULMANN, A.
6039
UTESHEV, N.S.
6168
UTILI, R.
5978
V. GIERKE, S.
6148
VACCA, C.
6275
VAGNER, E.A.
6163
VALBERG, L.S.
5869
VALDIVIESO, V.
5959*
VAN ALSTE, H.E.
6145
VAN DE VELDE, E.
5878*
VAN DEN BERG-LOONEN, E.M.
6316*, 6317*
VAN DER POMPE, W.B.
6071
VAN DEVENTER, G.
6193
VAN HEES, G.
6033
VAN HOORN-HICKMAN, R.
5914
VAN HOORN, R.
5914
VAN KNAPEN, F.
6545
VAN TONGEREN, J.H.
6505*
VANDERLINDEN, E.
6291
VANDERVELDE, E.M.
6438
VANTINI, I.
6342
VARAS LORENZO, M.J.
5911
VARGA, F.
5968*
VARHELYI, I.
6205
VARIS, K.
6154, 6155
VASILESCU, C.
6462*
VD MEY, T.
5981
VEECH, R.L.
5955*
VEIL, L.B.
6000
VENDRELL, B.
6405
VENKITASUBRAMANIAN, T.A.
5999
VERBEKE, W.
6291
VERGARA, G.G.
6555
VERRI, A.
6134*
VIAMONTE, M., JR.
6079
VIDAL, J.
6535
VIDON, N.
5933*
VIERLING, J.P.
6465*
VILARDELL, F.
6135*
VILLARREAL, E.
6416
VINCE, A.
6020*
VINIK, A.
6337*
VINIK, A.I.
5956*
VIRABYAN, G.R.
6089
VIRKKULA, L.
6097
VISWANATHAN, R.
5999
VO-KHACTU, K.P.
6563*
VOGTEN, A.J.M.
6358*
VOILLEMOT, N.
6262*
VOLKMAR, W.
6090
VONK, R.J.
5977
VORONKIN, G.V.
6168
VOSHCHANOVA, N.P.
6164
VOSSE, A.
6069
VRANIC, M.
6043*
WACHA, H.
6146
WAHNER, H.W.
6072
WALKER, B.E.
6157
WALKER, S.
6528
WALKER, W.A.
6253
WALLS, A.D.F.
6103
WALSER, R.
6206
WALTER, J.F.
6327
WANNAGAT, F.J.
5980
WARD, A.M.
6063*
WARRAM, J.H., JR.
6503*
WARREN, D.L.
6065*
WARREN, R.
6363*
WARSHAW, A.L.
6326*
WATANABE, H.
6243
WATERLOO, J.C.
6515
WATRIN, B.
5853
WATTS, J.M.
5962*
WAYE, J.D.
6324*
WEEKS, L.E.
6485
WEIBEL, E.R.
5952*
WEINBERG, G.
6399
WEINGART, J.
5920

WEINSTEIN, W.M.
6547
WEISBRODT, N.W.
5880*
WEISBURGER, J.H.
6184
WELCH, J.P.
6257*
WELMAN, S.
5874*
WERNLY, J.A.
6141*
WERNZE, H.
6360
WESCORP, E.
6096*
WESSELY, Z.
6471*
WESTABY, D.
6368*
WHEELER, P.G.
6250*
WICHRZYCKA, E.
6049
WICKS, J.D.
6533
WIDMER, F.
5945
WIECZOREK, K.
6049
WIGGINS, H.S.
6018*
WILBUR, J.
6428*
WILKINSON, S.P.
6363*, 6380, 6463*
WILLARD, H.R.
6042*
WILLIAMS, R.
6380, 6431*, 6442*, 6446, 6463*, 6464*
WILLIAMSON, D.
6129
WILLIAMSON, R.C.N.
6015*
WILLSON, R.A.
5954*, 6374
WILSON, R.J.
5910*
WILSON, R.M.
5934*
WINAWER, S.J.
6540
WINSHIP, D.H.
5887
WISCH, N.
6567
WOLKOFF, A.W.
6416
WOLPERT, E.
6416
WONG, D.C.
6427*
WONG, K.S.K.
6517
WOOD, J.B.
6336*
WOOD, J.M.
6143*
WOODARD, E.H.
6497
WOODS, M.
6028
WOOLLEY, M.M.
6336*
WOSIEWITZ, L.
6481*
WOSTMANN, B.S.
5961*
WRIGHT, P.A.
6142*
WRONG, C.M.
6020*
WUNKHAUS, R.
5959*
WURSCH, T.G.
6206
WYLLIE, J.H.
6114
WYSS, M.
5894
YADAV, M.
6251*
YAMAGISHI, T.
5877*, 5932*
YAMAMOTO, S.
6484
YANO, S.
5886
YAO, T.
6243
YARUSSKY, E.E.
6169
YAU, K.M.
6025
YAWATA, M.
5903*
YODER, I.C.
6227
YOUNG, M.
5893
YU, G.S.M.
6235
ZAPOROZHETS, V.K.
6167
ZASTROW, R.
6264
ZFASS, A.M.
5905*
ZHANGABYLOV, A.K.
6217
ZHUCHINA, T.S.
6172
ZIMMERMAN, A.
5863*
ZIMMERMAN, P.J.
5978
ZIMMON, D.S.
6003
ZIPPRICH, B.
6406
ZITTOUN, J.
6139*
ZLOTNICK, A.
6461*
ZMEUL, V.K.
6170
ZOGRABIAN, A.S.
6280
ZUBENKO, I.M.
5913

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

ABDOMEN
ABSCESS
SCANNING, SCINTILLATION, 6072
ADOLESCENCE
ANOMALY, 6533
CYSTS, 6533
ANOMALY
ULTRASONOGRAPHY, 6533
CHILD
ANOMALY, 6533
CYSTS, 6533
CHOLECYSTITIS
PAIN, 6498
CYSTS
ULTRASONOGRAPHY, 6533
HERNIA
DIAGNOSIS, 6229
RADIOLOGY, 6229
LAPAROSCOPY
NEOPLASM METASTASIS, 6087
SCANNING, SCINTILLATION
COMPLICATIONS, 6072
GALLIUM, 6072
RADIONUCLIDES, 6072

ABSCESS
ABDOMEN
SCANNING, SCINTILLATION, 6072
LIVER
DIAGNOSIS, 6391
SCANNING, SCINTILLATION, 6391
THERAPY, 6391
PANCREAS
CHOLANGIOGRAPHY, 6330
DIAGNOSIS, 6333*
DIET, 6333*
DRAINAGE, 6333*
ENDOSCOPY, 6330
PANCREATOGRAPHY, 6330
RADIOLOGY, 6333*
SURGERY, 6333*
ULTRASOUND, 6333*

ABSORPTION
CARBOHYDRATES, 6050
DUODENUM
VITAMIN D, 6039
GLUCOSE, 6050
JEJUNUM
MOTILITY, 6023
ULCER
DRUGS, 6142*
ULCER, PEPTIC
DRUGS, 6142*

ACHALASIA
DEGLUTITION DISORDERS, 6114
ESOPHAGUS
DILATATION, 6131
ENDOSCOPY, 6131
SPHINCTER, 6118
THYROCALCITONIN, 6118
STOMACH
NEOPLASMS, MALIGNANT, 6186

ACHLORHYDRIA
ANTRUM
GASTRIN, 6181

ACHLORHYDRIA, (continued)
SERUM
GASTRIN, 6181
STOMACH
GASTRIN, 6181

ACID SECRETION
SEE ALSO SECRETION
STOMACH
CIRCULATION, 6199*
DRUG EFFECTS ON, 6204*
H2 RECEPTOR ANTAGONISTS, 6204*
HEMODIALYSIS, 6140*
ULCER, PEPTIC, 6201*
VAGOTOMY, 6150
ULCER, PEPTIC
CIRCULATION, 6199*

ACIDITY
DUODENUM
BICARBONATE SECRETION, 6028
BILE ACIDS AND SALTS, 6200*
ENZYMES, 6200*
GASTROINTESTINAL DISEASES
VIRUSES, 6047

ACIDS
DIARRHEA
PREVENTION, 6017*
INTESTINE, SMALL
SECRETIN, 6026

ADENOSINE CYCLIC 3',5' MONOPHOSPHATE
LIVER DISEASES
SERUM, 6410
PANCREATIC DISEASES
SERUM, 6410

ADENOSINE TRIPHOSPHATASE
BACTERIA
ENDOTOXINS, 5978
LIVER
BACTERIA, 5978
ENDOTOXINS, 5978
MEMBRANES, 5978

ADENOSINE TRIPHOSPHATE
LIVER
ISCHEMIA, 5971*
ORGAN CULTURE, 5971*

ADOLESCENCE
ABDOMEN
ANOMALY, 6533
CYSTS, 6533
CROHN'S DISEASE
DIAGNOSIS, 6557*
RADIOLOGY, 6557*
THERAPY, 6557*

ALBUMINS
BILE
SECRETION, 5982
SERUM
FATTY LIVER, 6406
HEPATITIS, 6406
LIVER CIRRHOSIS, 6406
LIVER DISEASES, 6406

ALCOHOLIC LIVER DISEASE
SEE LIVER DISEASES, ALCOHOLIC

ALCOHOLISM
LIVER
DRUG METABOLISM, 6447*
PANCREATITIS
DIAGNOSIS, 6346

ALCOHOLS
CARCINOEMBRYONIC ANTIGEN
NEOPLASMS, 6077
NEOPLASMS, MALIGNANT, 6077
DUODENUM
HEMORRHAGE, 6102
ESOPHAGUS
HEMORRHAGE, 6102
HEMATOPOIESIS
CYTOTOXICITY, 6516
HEPATOCYTES
OXIDATION, 5955*
INTESTINE, SMALL
CYTOTOXICITY, 6516
LIVER
OXIDATION, 5955*
LIVER INJURY
DIAGNOSIS, 6449*
ETIOLOGY, 6449*
PATHOLOGY, 6449*
STOMACH
HEMORRHAGE, 6102

ALKALIS
ESOPHAGEAL REFLUX, 6141*
ESOPHAGITIS
ETIOLOGY, 6141*

ALKALOIDS
HEPATOCYTES
BINDING, 5990

ALLERGY
SEE HYPERSENSITIVITY

ALPHA FETOPROTEIN
CELL CULTURE
SYNTHESIS, 6002
HEPATITIS, 6351*
LIVER
NECROSIS, 6351*
NEOPLASMS, MALIGNANT, 6062*, 6360*
REGENERATION, 6351*

AMINES
HEPATITIS, CHRONIC
BLOOD, 6413
URINE, 6413
INTESTINE, LARGE
NEOPLASM METASTASIS, 6070
LIVER CIRRHOSIS
BLOOD, 6413
URINE, 6413
LIVER DISEASES
BLOOD, 6413
URINE, 6413

AMINO ACIDS
DIARRHEA
CHILD, 6531

AMINO ACIDS (continued)
LIVER FUNCTION TESTS
PLASMA, 6405
MALABSORPTION SYNDROMES
CHILD, 6531
NUTRITION DISORDERS
CHILD, 6532
INFANT, 6532
SALIVA, 6532
PROTEIN-LOSING ENTEROPATHIES
CHILD, 6531, 6532
INFANT, 6532
SALIVA, 6532

AMMONIA
COLON
METABOLISM, 6020*
FECES
METABOLISM, 6020*
LIVER COMA
HEPATECTOMY, 5981
PATHOLOGY, 6393
METABOLISM
DISACCHARIDES, 6020*

AMPULLA OF VATER
SEE VATER'S AMPULA

AMYLASES
CHOLANGIOGRAPHY
REVIEW, 6067*
ENDOSCOPY
REVIEW, 6067*
HYPERAMYLASEMIA
DISEASES ASSOCIATED WITH, 6326*
ETIOLOGY, 6326*
PANCREATOGRAPHY
REVIEW, 6067*

ANDROGENS
LIVER
CYSTS, 6368*
HYPERPLASIA, 6368*
MORPHOLOGY, 6368*
NEOPLASMS, 6368*
PROLACTIN, 6005

ANEMIA
GASTRITIS
FAMILIAL FACTORS, 6155
PEPSINOGEN
DIAGNOSIS, 6154

ANEMIA, HEMOLYTIC
HEPATITIS, CHRONIC
COMPLICATIONS, 6444*
LIVER CIRRHOSIS
COMPLICATIONS, 6444*

ANESTHESIA
STOMACH
ANTACIDS, 6512
PARASYMPATHOLYTICS, 6512

ANESTHETICS
DUODENUM
HORMONES, 6031

ANESTHETICS (continued)
HEPATITIS, NONVIRAL
CHEMICAL PROPERTIES, 5967*
DRUG-INDUCED, 5967*
HEPATITIS, TOXIC
DRUG-INDUCED, 5967*
LIVER
BINDING, 5966*
NECROSIS, 5967*
NUCLEIC ACIDS, 5966*
LIVER INJURY
CHEMICAL PROPERTIES, 5967*
DRUG-INDUCED, 5967*
NUCLEIC ACIDS
BINDING, 5966*
VAGOTOMY
COMPLICATIONS, 6169

ANGIOGRAPHY
GASTROINTESTINAL DISEASES
DIAGNOSIS, 6086
INTESTINE, SMALL
MELENA, 6247
NEOPLASMS, 6247
PANCREAS
ANOMALY, 6327

ANOMALY
ABDOMEN
ADOLESCENCE, 6533
CHILD, 6533
ULTRASONOGRAPHY, 6533
ANTRUM
MOTILITY, 6194
APPENDIX
MORPHOLOGY, 6274
BILIARY TRACT
AGE FACTORS, 6325*
CLASSIFICATION, 6325*
PANCREATIC DUCT, 6325*
SEX FACTORS, 6325*
DUODENUM
PANCREATITIS, CHRONIC, 6347
GALLBLADDER
ULTRASONOGRAPHY, 6495
PANCREAS
ANGIOGRAPHY, 6327
CIRCULATION, 6327
RECTUM
DIAGNOSIS, 6307
STOMACH
GALLBLADDER, 6497
MOTILITY, 6194
ULTRASONOGRAPHY
DIAGNOSIS, 6533

ANOMALY, CONGENITAL
INTESTINES
SURGERY, 6272
THERAPY, 6272
PERITONEUM
RADIOLOGY, 6539

ANORECTUM
SEE ALSO ANUS, RECTUM
DISEASE
SURGERY, 6267
THERAPY, 6267
INCONTINENCE, 6270

ANTACIDS
STOMACH
ANESTHESIA, 6512
ULCER, PEPTIC, 6144*
ULCER, PEPTIC
DRUG THERAPY, 6144*

ANTHELMINTICS
PARASITES AND PARASITIC DISEASES, 5997

ANTIBIOTICS
BILE ACIDS AND SALTS
DRUG EFFECTS ON, 5961*
COLITIS
CLOSTRIDIUM, 6259*
DRUG-INDUCED, 6298
CROHN'S DISEASE
DRUG THERAPY, 6566
DIARRHEA
DRUG-INDUCED, 6501*
SHIGELLOSIS
INFANT, 6542

ANTIBODIES
AUSTRALIA ANTIGEN, 6433*
CELIAC DISEASE
CONNECTIVE TISSUE, 6499*
COLONIC DISEASES
CONNECTIVE TISSUE, 6499*
ESOPHAGEAL DISEASES
CONNECTIVE TISSUE, 6499*
GASTRIN
RADIOIMMUNOASSAY, 6078
GASTROINTESTINAL DISEASES
AGE FACTORS, 6499*
HEPATITIS, CHRONIC, 6443*
LIVER DISEASES
CONNECTIVE TISSUE, 6499*
MALABSORPTION SYNDROMES
CONNECTIVE TISSUE, 6499*
STOMACH DISEASES
CONNECTIVE TISSUE, 6499*

ANTICHOLINERGIC AGENTS
SEE PARASYMPATHOLYTICS

ANTIDIABETIC AGENTS
SEE HYPOGLYCEMIC AGENTS

ANTIDIARRHEALS
DIARRHEA, 6534

ANTIGEN, AUSTRALIA
SEE AUSTRALIA ANTIGEN

ANTIGEN, CARCINOEMBRYONIC
SEE CARCINOEMBRYONIC ANTIGEN

ANTIGENS
COLITIS, ULCERATIVE, 6044*
GASTROINTESTINAL DISEASES
DISEASES ASSOCIATED WITH, 6520
HEPATITIS
CHROMATOGRAPHY, 6435*
HEPATITIS, CHRONIC
RADIOIMMUNOASSAY, 5995
HEPATITIS, INFECTIOUS
CHROMATOGRAPHY, 6435*
ELECTROPHORESIS, 6437

ANTIGENS (continued)
HEPATITIS, INFECTIOUS (continued)
RADIOIMMUNOASSAY, 5995

ANTRUM
GASTRECTOMY
COMPLICATIONS, 6134*
GASTRIN
ACHLORHYDRIA, 6181
MOTILITY
ANOMALY, 6194

ANUS
SEE ALSO ANORECTUM
FISTULA
REVIEW, 6311
SURGERY, 6311
THERAPY, 6311
NEOPLASMS, MALIGNANT
THERAPY, 6291

AORTA
FISTULA
HEMORRHAGE, 6518

APPENDECTOMY
APPENDIX, 6276
COMPLICATIONS, 6279, 6280

APPENDICITIS
CHOLECYSTITIS, 6498
DIAGNOSIS
CHILD, 6277, 6278
FAMILIAL FACTORS, 6281
INTESTINES
MOTILITY, 6282

APPENDIX
ANOMALY
MORPHOLOGY, 6274
APPENDECTOMY, 6276
NEOPLASMS, 6284
NEOPLASMS, MALIGNANT, 6283
STRANGULATION, 6275

ARTERIES
LIVER
SCHISTOSOMIASIS, 6553

ARTERIOGRAPHY
INTESTINE, SMALL
MELENA, 6247
NEOPLASMS, 6247

ASCITES
HYPERTENSION, PORTAL
REVIEW, 6467
LIVER
BIOPSY, 6355*
PANCREAS
PSEUDOCYSTS, 6331

ASPIRIN
DUODENUM
HEMORRHAGE, 6102
ESOPHAGUS
HEMORRHAGE, 6102
INTESTINE, SMALL
DRUG EFFECTS ON, 6180

ASPIRIN (continued)
JEJUNUM
DRUG EFFECTS ON, 6180
STOMACH
HEMORRHAGE, 6102

ATRESIA
ESOPHAGUS
DISEASES ASSOCIATED WITH, 6105
INFANT, 6112
RESPIRATORY SYSTEM, 6105
SURGERY, 6112
THERAPY, 6128
SURGERY
COMPLICATIONS, 6112

AUSTRALIA ANTIGEN
ANTIBODIES, 6433*
ASSAY
TECHNIQUES, 6438
EPIDEMIOLOGY, 6428*
HEPATITIS, CHRONIC, 6441*
HEPATITIS, INFECTIOUS
AGE FACTORS, 6434*
ASSAY, 6438
DRUG DEPENDENCE, 6434*
RISK FACTORS, 6434*
TRANSFUSION, 6434*, 6436
TRANSMISSION, 6436
LIVER CIRRHOSIS
FAMILIAL FACTORS, 6461*
LIVER DISEASES
DRUG THERAPY, 6379
IMMUNOSUPPRESSION, 6379
TRANSFUSION
TRANSMISSION, 6436
TRANSMISSION, 6432*
OCCUPATIONAL FACTORS, 6436
RISK FACTORS, 6436

BACTERIA
ADENOSINE TRIPHOSPHATASE
ENDOTOXINS, 5978
CHOLESTASIS
ENDOTOXINS, 5978
COLON
DIETARY FACTORS, 6018*
FATS, 6018*
CROHN'S DISEASE, 6564
DIARRHEA
PREVENTION, 6503*
STEROIDS, 6504*
FECES
DIETARY FACTORS, 6018*
FATS, 6018*
INTESTINE, LARGE
DIETARY FACTORS, 6018*
FATS, 6018*
INTESTINES
PANCREAS FUNCTION TESTS, 6008*
LIVER
ADENOSINE TRIPHOSPHATASE, 5978
LIVER COMA
HEPATECTOMY, 5981

BACTERIAL INFECTIONS
BILIARY TRACT
OBSTRUCTION, 6417*

BACTERIAL INFECTIONS (continued)
HEPATITIS, CHRONIC
COMPLICATIONS, 6444*
HEPATITIS, NONVIRAL, 6417*
INTESTINES
DIAGNOSIS, 6308
LIVER, 6417*
LIVER CIRRHOSIS
COMPLICATIONS, 6444*

BARIUM
COLITIS, ULCERATIVE
SURVIVAL, 6318*
COLON
NEOPLASMS, MALIGNANT, 6318*
ESOPHAGUS
MORPHOLOGY, 6056*
TECHNIQUES, 6056*
HERNIA
ENEMA, 6229
INTESTINE, SMALL
MORPHOLOGY, 6056*
TECHNIQUES, 6056*
STOMACH
MORPHOLOGY, 6056*
TECHNIQUES, 6056*
VATER'S AMPULLA
DUODENOGRAPHY, 6237

BARRETT'S SYNDROME
ESOPHAGUS
PRECANCEROUS CONDITIONS, 6098

BICARBONATE SECRETION
DUODENUM
ACIDITY, 6028

BILE
BILE DUCTS
SECRETION, 5980
SURGERY, 5980
BILIARY TRACT DISEASES
DIAGNOSIS, 6080
SECRETION, 6080
BILIRUBIN
EXCRETION, 5973
CHEMICAL COMPOSITION
AGE FACTORS, 5959*
DIETARY FACTORS, 5962*
PREGNANCY, 6476*
CHOLELITHIASIS
LIPIDS, 6491
CHOLESTASIS, 5969*
LYSOSOMES, 6478*
CHOLESTEROL
AGE FACTORS, 5959*
CHENODEOXYCHOLIC ACID, 5963*
DIETARY FACTORS, 5962*
OBESITY, 5959*
CHROMATOGRAPHY
PREGNANCY, 6476*
COMMON BILE DUCT
DIAGNOSIS, 6080
SECRETION, 6080
DRUG METABOLISM
PHENOBARBITAL, 5968*
GALLBLADDER
DIETARY FACTORS, 5962*
PREGNANCY, 6476*
ULTRASOUND, 6001

BILE (continued)
HYPERLIPOPROTEINEMIA
LIPIDS, 6365*
ILEUM
MITOSIS, 6015*
INDOCYANINE GREEN
CLEARANCE STUDY, 5968*
INTESTINE, SMALL
HYPERPLASIA, 5996
MITOSIS, 6015*
JAUNDICE, OBSTRUCTIVE
LYSOSOMES, 6478*
LIPIDS
AGE FACTORS, 5959*
CONTRAST MEDIA, 6469*
OBESITY, 5959*
PORPHYRIA
HEME, 6384
SECRETION
ALBUMINS, 5982
INTESTINE, SMALL, 5996
SULFOBROMOPHTHALEIN
CLEARANCE STUDY, 5968*
TRANSPORT
PHENOBARBITAL, 5968*

BILE ACIDS AND SALTS
BILE DUCTS
SECRETION, 5980
SURGERY, 5980
BILIARY TRACT
SECRETIN, 5986
CHOLESTASIS, 5969*
PHENOBARBITAL, 6378
CHROMATOGRAPHY
PREGNANCY, 6476*
CLEARANCE STUDY, 6404
SECRETIN, 5986
DRUG EFFECTS ON
ANTIBIOTICS, 5961*
DUODENUM
ACIDITY, 6200*
ENZYMES, 6200*
GALLBLADDER
PREGNANCY, 6476*
HEPATOCYTES
DRUG METABOLISM, 5977
LIVER
DRUG METABOLISM, 5977
TRANSPORT, 5979
LIVER DISEASES
SERUM, 6403
TECHNIQUES, 6403
METABOLISM
AGE FACTORS, 5959*
CHOLELITHIASIS, 6475*
LIVER DISEASES, 6475*
OBESITY, 5959*
PREGNANCY, 6476*
PORTACAVAL SHUNT
SECRETION, 5984
SECRETION
CHOLELITHIASIS, 6475*
LIVER DISEASES, 6475*
SERUM
CHOLELITHIASIS, 6475*
LIVER DISEASES, 6475*

BILE DUCTS
BILE
SECRETION, 5980
BILE ACIDS AND SALTS
SECRETION, 5980
FASCIOLIASIS
HYPERPLASIA, 5998
NEOPLASMS
SURGERY, 6390
OBSTRUCTION
BIOPSY, 6471*
CHOLANGIOGRAPHY, 6471*
DIAGNOSIS, 6471*
ENDOSCOPY, 6471*
ODDI'S SPHINCTER
STENOSIS, 6483*
RADIOLOGY
CONTRAST MEDIA, 6094
STENOSIS
DIAGNOSIS, 6483*
PROSTHESIS, 5958*
SURGERY, 6483*
STRICTURE
CHOLANGIOJEJUNOSTOMY, 6356*
SURGERY
BILE, 5980
BILE ACIDS AND SALTS, 5980
WOUNDS AND INJURIES
IATROGENESIS, 6492
PROSTHESIS, 5958*

BILE SALTS
SEE BILE ACIDS AND SALTS

BILIARY CIRRHOSIS
SEE LIVER CIRRHOSIS, OBSTRUCTIVE

BILIARY TRACT
ANOMALY
AGE FACTORS, 6325*
CLASSIFICATION, 6325*
SEX FACTORS, 6325*
BILE ACIDS AND SALTS
SECRETIN, 5986
CARBOHYDRATES
SECRETIN, 5986
CHOLECYSTECTOMY
CHOLANGIOGRAPHY, 6486
CYSTIC FIBROSIS
OBSTRUCTION, 6332
DILATATION
PANCREATIC DUCT, 6325*
NEOPLASMS
CHOLANGIOGRAPHY, 6328
ENDOSCOPY, 6328
OBSTRUCTION
BACTERIAL INFECTIONS, 6417*
BIOPSY, 6489
CHOLANGIOGRAPHY, 6489
DIAGNOSIS, 6489
ULTRASONOGRAPHY, 6489
PANCREAS
NEOPLASMS, 6332
PANCREATIC DUCT
ANOMALY, 6325*
PROSTHESIS
SURGERY, 5958*

BILIARY TRACT (continued)
RADIONUCLIDES
ANALYSIS, 6076
COMPLICATIONS, 6076
SCANNING, SCINTILLATION, 6071
TECHNIQUES, 6071, 6075
TRACER STUDY, 6075
ULTRASOUND
DIAGNOSIS, 6083

BILIARY TRACT DISEASES
BILE
DIAGNOSIS, 6080
SECRETION, 6080
CHOLANGIOGRAPHY
PANCREATOGRAPHY, 6092
DIAGNOSIS
BIOCHEMISTRY, 6402
CHOLANGIOGRAPHY, 6091
CHOLECYSTOGRAPHY, 6091
ENZYMES, 6402
TECHNIQUES, 6080
DUODENUM
DIVERTICULUM, 6238
ENDOSCOPY, 6092
SURGERY
COMPLICATIONS, 6490
REVIEW, 6490

BILIRUBIN
BILE
EXCRETION, 5973
EXCRETION
DRUG-INDUCED, 5973
METABOLISM
GENETICS, 6416
PORPHYRIA
HEME, 6384

BIRTH
SEE PREGNANCY

BLADDER
SEE URINARY SYSTEM

BLEEDING
SEE ALSO HEMORRHAGE
DUODENUM
DISEASES ASSOCIATED WITH, 6197
LASER, 6045*
THERAPY, 6045*
ESOPHAGUS
REVIEW, 6127
STOMACH, 6127
GASTROINTESTINAL SYSTEM
ENDOSCOPY, 6057*
LASER, 6045*
THERAPY, 6042*, 6045*
HYPERTENSION, PORTAL
VARICES, 6468
INTESTINE, SMALL
MELENA, 6247
NEOPLASMS, 6247
LIVER
BIOPSY, 6355*
LIVER INJURY
SURVIVAL, 6371*

BLEEDING (continued)
STOMACH
DISEASES ASSOCIATED WITH, 6197
LASER, 6045*
THERAPY, 6045*
THERAPY
COMPUTERS, 6042*
LASER, 6045*

BLOOD
CARBOHYDRATES
DIGESTION, 6050
GLUCOSE
DIGESTION, 6050
HEPATITIS, CHRONIC
AMINES, 6413
INTESTINE, SMALL
OSMOTIC PRESSURE, 6054
LIVER CIRRHOSIS
AMINES, 6413
LIVER DISEASES
AMINES, 6413

BLOOD FLOW
SEE CIRCULATION

BLOOD PLATELETS
CROHN'S DISEASE
KINETICS, 6559*
HEPATITIS, INFECTIOUS
PREVENTION, 6429*
TRANSFUSION, 6429*
TRANSMISSION, 6429*

BOMBESIN
SEE HORMONES, GASTROINTESTINAL

BONES
LIVER CIRRHOSIS
COMPLICATIONS, 6452*
LIVER DISEASES, ALCOHOLIC
COMPLICATIONS, 6452*

BREAST FEEDING
GASTROENTERITIS
PREVENTION, 6546

BUDD-CHIARI SYNDROME
SEE ALSO HEPATIC VEIN THROMBOSIS
CONTRACEPTIVES, ORAL, 6388
LIVER DISEASES, ALCOHOLIC
SHUNT, 6357*
SHUNT
TECHNIQUES, 6357*
THERAPY, 6357*

BURNS, CHEMICAL
STOMACH
CIRCULATION, 6166
MORPHOLOGY, 6166
VEINS, 6166

CALCIFICATION
GALLBLADDER
DIAGNOSIS, 6479*
NEOPLASMS, MALIGNANT, 6479*
GASTROINTESTINAL SYSTEM
NEOPLASMS, 6508*

CALCITONIN
SEE THYROCALCITONIN

CALCIUM
ENDOCRINE SYSTEM
GASTRIN, 6510
INTESTINES
MUCUS, 6038

CALCULI
PIGMENTS
CHEMICAL COMPOSITION, 6481*

CANCER
SEE NEOPLASMS

CARBOHYDRATES
ABSORPTION, 6050
BILIARY TRACT
SECRETIN, 5986
CLEARANCE STUDY
SECRETIN, 5986
DIGESTION
BLOOD, 6050
BODY COMPOSITION, 6050
METABOLISM, 6050
PHYSIOLOGY, 6050
GASTROENTERITIS
INFANT, 6536
INTOLERANCE, 6536

CARCINOEMBRYONIC ANTIGEN
ALCOHOLS
NEOPLASMS, 6077
NEOPLASMS, MALIGNANT, 6077
GASTROINTESTINAL SYSTEM
NEOPLASMS, MALIGNANT, 6088
INTESTINE, LARGE
NEOPLASM METASTASIS, 6070
NEOPLASMS
DIAGNOSIS, 6077
SMOKING, 6077
NEOPLASMS, MALIGNANT
DIAGNOSIS, 6077, 6088
SMOKING, 6077

CARCINOGENS
LIVER
NEOPLASMS, 6389

CARDIOVASCULAR SYSTEM
SEE ALSO CIRCULATION
DRUG EFFECTS ON, 6211

CECUM
CROHN'S DISEASE
PROGNOSIS, 6560*
RECURRENCE, 6560*
REVIEW, 6560*
SURGERY, 6560*
SURVIVAL, 6560*
SECRETION
ELECTROLYTES, 6021
WATER, 6021

CELIAC DISEASE
COLON
ULCER, 6252

CELIAC DISEASE (continued)
CONNECTIVE TISSUE
ANTIBODIES, 6499*
DIAGNOSIS
CHILD, 6248*
ENZYMES
DEFICIENCY, 6249*
GASTROINTESTINAL SYSTEM
PERMEABILITY, 6250*
LYMPHOCYTES, 6228
TOXINS
CHEMICAL COMPOSITION, 6249*

CELL CULTURE
ALPHA FETOPROTEIN
SYNTHESIS, 6002
HEPATOCYTES
HORMONES, 5988
HORMONES, GASTROINTESTINAL, 5988

CERULOPLASMIN
LIVER CIRRHOSIS
COPPER, 6465*
WILSON'S DISEASE
COPPER, 6465*

CHEMICAL BURNS
SEE BURNS, CHEMICAL

CHEMOTHERAPY
SEE DRUG THERAPY

CHENODEOXYCHOLIC ACID
BILE
CHOLESTEROL, 5963*
CHOLELITHIASIS
DRUG THERAPY, 6482*
HYPERLIPOPROTEINEMIA, 6365*
SERUM
LIPIDS, 5963*

CHILD
ABDOMEN
ANOMALY, 6533
CYSTS, 6533
APPENDICITIS
DIAGNOSIS, 6277, 6278
CELIAC DISEASE
DIAGNOSIS, 6248*
CONSTIPATION
COLON, 6538
MOTILITY, 6538
CROHN'S DISEASE
DIAGNOSIS, 6557*
PROGNOSIS, 6556*
RADIOLOGY, 6557*
THERAPY, 6557*
DIARRHEA
AMINO ACIDS, 6531
DUODENUM
ENDOSCOPY, 6543
ESOPHAGEAL REFLUX
DISEASES ASSOCIATED WITH, 6117
ESOPHAGITIS, 6120
FEEDING, 6116
HIATAL HERNIA, 6120
STOMACH, 6116
ESOPHAGUS
ENDOSCOPY, 6543

CHILD (continued)
FATTY LIVER
ETIOLOGY, 6456*
REVIEW, 6456*
THERAPY, 6456*
GASTROENTERITIS
VIRUSES, 6517
LIVER
NEOPLASMS, MALIGNANT, 6361*
MALABSORPTION SYNDROMES
AMINO ACIDS, 6531
CONNECTIVE TISSUE, 6499*
DIARRHEA, 6531
NUTRITION DISORDERS
AMINO ACIDS, 6532
ENZYMES, 6526
PROTEINS, 6532
PANCREATITIS
PROGNOSIS, 6336*
REVIEW, 6336*
PROTEIN-LOSING ENTEROPATHIES
AMINO ACIDS, 6531, 6532
DIARRHEA, 6531
MALABSORPTION SYNDROMES, 6531
PROTEINS, 6532
PYLORUS
STENOSIS, 6175
STOMACH
ENDOSCOPY, 6543
ULCER, 6207

CHLORIDES
LIVER
TECHNIQUES, 5972*
LIVER DISEASES
SCHISTOSOMIASIS, 5972*

CHOLANGIOGRAPHY
AMYLASES
REVIEW, 6067*
BILE DUCTS
OBSTRUCTION, 6471*
BILIARY TRACT
CHOLECYSTECTOMY, 6486
NEOPLASMS, 6328
OBSTRUCTION, 6489
BILIARY TRACT DISEASES
DIAGNOSIS, 6091
PANCREATOGRAPHY, 6092
CHOLESTASIS
TECHNIQUES, 6470*
COMMON BILE DUCT
ANALYSIS, 6472*
COMPLICATIONS, 6472*
CONTRAST MEDIA, 6090
GALLBLADDER DISEASES
DIAGNOSIS, 6082
JAUNDICE, OBSTRUCTIVE, 6471*
TECHNIQUES, 6488
LAPAROSCOPY, 6408
LIVER DISEASES
TECHNIQUES, 6488
ODDI'S SPHINCTER
REVIEW, 6068
TECHNIQUES, 6068
PANCREAS
ABSCESS, 6330
PANCREATIC DISEASES
PANCREATOGRAPHY, 6092

CHOLANGIOGRAPHY (continued)
PANCREATOGRAPHY
ANALYSIS, 6472*
COMPLICATIONS, 6472*
TECHNIQUES, 6408
ULTRASOUND
DIAGNOSIS, 6083

CHOLECYSTECTOMY
BILIARY TRACT
CHOLANGIOGRAPHY, 6486

CHOLECYSTITIS
ABDOMEN
PAIN, 6498
APPENDICITIS, 6498
DIAGNOSIS
SCANNING, SCINTILLATION, 6064*
DIVERTICULITIS, 6498
INTESTINAL OBSTRUCTION, 6498

CHOLECYSTOGRAPHY
BILIARY TRACT DISEASES
DIAGNOSIS, 6091
CONTRAST MEDIA, 6093
REVIEW, 6095

CHOLELITHIASIS
AGE FACTORS, 5959*
BILE
LIPIDS, 6491
BILE ACIDS AND SALTS
METABOLISM, 6475*
DIETARY FACTORS
FIBERS, 5962*
DRUG THERAPY
CHENODEOXYCHOLIC ACID, 6482*
PHENOBARBITAL, 6482*
OBESITY, 5959*
OBSTRUCTION
ULTRASOUND, 6065*
RADIOLOGY
DYSPEPSIA, 6480*
SECRETION
BILE ACIDS AND SALTS, 6475*
SERUM
BILE ACIDS AND SALTS, 6475*
ULTRASOUND
REVIEW, 6065*

CHOLERA
INTESTINE, SMALL
CIRCULATION, 6041*
ENZYMES, 6036
MORPHOLOGY, 6036
SECRETION, 6017*

CHOLERESIS
DRUG EFFECTS ON, 5985

CHOLESTASIS
BACTERIA
ENDOTOXINS, 5978
BILE, 5969*
BILE ACIDS AND SALTS, 5969*
CHOLANGIOGRAPHY
TECHNIQUES, 6470*
CHOLESTEROL, 5969*
DRUG-INDUCED, 6487

CHOLESTASIS (continued)
DUODENUM
DIVERTICULUM, 6235
JAUNDICE
PREGNANCY, 6367*
LIPOPROTEINS
DIAGNOSIS, 6063*
LYSOSOMES
BILE, 6478*
PHENOBARBITAL
BILE ACIDS AND SALTS, 6378

CHOLESTEROL
BILE
AGE FACTORS, 5959*
CHENODEOXYCHOLIC ACID, 5963*
DIETARY FACTORS, 5962*
OBESITY, 5959*
CHOLESTASIS, 5969*
HEPATOCYTES
SYNTHESIS, 5991
ILEUM
SYNTHESIS, 6007*
INTESTINE, SMALL
SYNTHESIS, 6007*
PORTACAVAL SHUNT
SECRETION, 5984

CHROMATOGRAPHY
BILE
PREGNANCY, 6476*
BILE ACIDS AND SALTS
PREGNANCY, 6476*
HEPATITIS
ANTIGENS, 6435*
HEPATITIS, INFECTIOUS
ANTIGENS, 6435*

CIRCADIAN RHYTHM
DISACCHARIDASES
NEONATE, 6009*
INTESTINE, SMALL
DISACCHARIDASES, 6009*
PROTEINS
SYNTHESIS, 5957*

CIRCULATION
SEE ALSO CARDIOVASCULAR SYSTEM
COLON, 6052
INTESTINE, SMALL
CHOLERA, 6041*
OSMOTIC PRESSURE, 6054
INTESTINES
ULTRASOUND, 6006*
LIVER COMA
URINARY SYSTEM, 5992
LIVER INJURY, 6003
MESENTERY
DRUG EFFECTS ON, 6040*
VASOPRESSIN, 6040*
PANCREAS
ANOMALY, 6327
SIGMOID, 6052
STOMACH
ACID SECRETION, 6199*
BURNS, CHEMICAL, 6166
CLEARANCE STUDY, 6199*
ULCER
STENOSIS, 6167

CIRCULATION (continued)
ULCER, PEPTIC
ACID SECRETION, 6199*
STENOSIS, 6167

CIRRHOSIS
SEE LIVER CIRRHOSIS

CIRRHOSIS, BILIARY
SEE LIVER CIRRHOSIS, OBSTRUCTIVE

CLOSTRIDIUM
COLITIS
ANTIBIOTICS, 6259*
TOXINS, 6259*

COLITIS
CLOSTRIDIUM
ANTIBIOTICS, 6259*
TOXINS, 6259*
DIAGNOSIS, 6299
DIET
FIBERS, 6303
DRUG-INDUCED
ANTIBIOTICS, 6298
DRUG THERAPY, 6298
PROTOZOAL DISEASES
SURGERY, 6555
SURGERY, 6302
THERAPY, 6299
DIET, 6303
FIBERS, 6303

COLITIS, ULCERATIVE
ANTIGENS, 6044*
BARIUM
SURVIVAL, 6318*
COLON
PRECANCEROUS CONDITIONS, 6323
EPIDEMIOLOGY, 6321, 6322
IMMUNITY
INTEGUMENTARY SYSTEM, 6315*
SURGERY, 6315*
IMMUNOGLOBULINS
DEFICIENCY, 6319
IMMUNOLOGY, 6044*
MUSCULOSKELETAL SYSTEM
DISEASES ASSOCIATED WITH, 6316, 6317*
ETIOLOGY, 6317*
GENETICS, 6317*
NEOPLASMS, MALIGNANT
RADIOLOGY, 6318*
RADIOLOGY
SURVIVAL, 6318*
SALIVA
IMMUNOGLOBULINS, 6319
SURVIVAL, 6322

COLON
SEE ALSO INTESTINE, LARGE, SIGMOID
AMMONIA
METABOLISM, 6020*
BACTERIA
DIETARY FACTORS, 6018*
FATS, 6018*
CELIAC DISEASE
ULCER, 6252
CIRCULATION, 6052

COLON (continued)
CONSTIPATION
CHILD, 6538
DILATATION
AGE FACTORS, 6310
DISTENTION
AGE FACTORS, 6310
DIVERTICULITIS
SURGERY, 6305
THERAPY, 6305
DIVERTICULUM, 6306
DIET, 6303
FIBERS, 6303
THERAPY, 6303, 6304
ENDOSCOPY
TECHNIQUES, 6266
FISTULA
DRUG THERAPY, 6187
HEALING, 6187
INFLAMMATORY BOWEL DISEASES
SEQUELAE, 6312*
MORPHOLOGY
GLYCOPROTEINS, 6011*
MOTILITY
DIETARY FACTORS, 6018*
FATS, 6018*
NEOPLASMS
DIAGNOSIS, 6074
PATHOLOGY, 6260*
RADIOLOGY, 6261*
RADIOTHERAPY, 6258*
RECURRENCE, 6257*
REVIEW, 6258*, 6261*
SIGMOIDOSCOPY, 6074
SURGERY, 6258*, 6260*
THERAPY, 6257*, 6258*
NEOPLASMS, MALIGNANT
BARIUM, 6318*
SURGERY, 6289
THERAPY, 6289, 6291
PANCREATITIS
DISEASES ASSOCIATED WITH, 6339*
NECROSIS, 6340*
PRECANCEROUS CONDITIONS
COLITIS, ULCERATIVE, 6323
SPRUE
ULCER, 6252
SURGERY, 6268
VILLI
NEOPLASMS, 6260*

COLONIC DISEASES
CONNECTIVE TISSUE
ANTIBODIES, 6499*
DIAGNOSIS
ENDOSCOPY, 6264
RADIOLOGY, 6264, 6265
DRUG THERAPY, 6296

COLOSTOMY
TECHNIQUES, 6292

COMMON BILE DUCT
BILE
DIAGNOSIS, 6080
SECRETION, 6080
CHOLANGIOGRAPHY
ANALYSIS, 6472*
COMPLICATIONS, 6472*

COMMON BILE DUCT (continued)
NEOPLASMS, BENIGN
JAUNDICE, 6496
ODDI'S SPHINCTER
ENDOSCOPY, 6069
PANCREATIC DUCT
ENDOSCOPY, 6472*
PROSTHESIS
SURGERY, 5958*
ULTRASONOGRAPHY
TECHNIQUES, 6066*
VARICES
SURGERY, 6494

COMPUTERS
BLEEDING
THERAPY, 6042*

CONNECTIVE TISSUE
CELIAC DISEASE
ANTIBODIES, 6499*
COLONIC DISEASES
ANTIBODIES, 6499*
ESOPHAGEAL DISEASES
ANTIBODIES, 6499*
LIVER DISEASES
ANTIBODIES, 6499*
MALABSORPTION SYNDROMES
ANTIBODIES, 6499*
CHILD, 6499*
STOMACH DISEASES
ANTIBODIES, 6499*

CONSTIPATION
CHILD
COLON, 6538
MOTILITY, 6538
DIET
FIBERS, 6303
DISEASES ASSOCIATED WITH
HERNIA, 6242
THERAPY
DIET, 6303
FIBERS, 6303

CONTRACEPTIVES, ORAL
BUDD-CHIARI SYNDROME, 6388
HEPATIC VEIN THROMBOSIS, 6388
LIVER
NEOPLASMS, BENIGN, 6366*

CONTRAST MEDIA
BILE
LIPIDS, 6469*
BILE DUCTS
RADIOLOGY, 6094
CHOLANGIOGRAPHY, 6090
CHOLECYSTOGRAPHY, 6093
GASTROINTESTINAL SYSTEM
RADIOLOGY, 6085

COPPER
LIVER CIRRHOSIS
CERULOPLASMIN, 6465*
KINETICS, 6465*
WILSON'S DISEASE
CERULOPLASMIN, 6465*
KINETICS, 6465*

CROHN'S DISEASE
ADOLESCENCE
DIAGNOSIS, 6557*
RADIOLOGY, 6557*
THERAPY, 6557*
BACTERIA, 6564
BLOOD PLATELETS
KINETICS, 6559*
CECUM
PROGNOSIS, 6560*
RECURRENCE, 6560*
REVIEW, 6560*
SURGERY, 6560*
SURVIVAL, 6560*
CHILD
DIAGNOSIS, 6557*
RADIOLOGY, 6557*
THERAPY, 6557*
DRUG THERAPY, 6565
ANTIBIOTICS, 6566
IMMUNOSUPPRESSION, 6567
EPIDEMIOLOGY, 6321
ILEUM
BREATH TEST, 6558*
MORPHOLOGY, 6558*
PHYSIOLOGY, 6558*
PROGNOSIS, 6560*
RADIOLOGY, 6558*
RECURRENCE, 6560*
REVIEW, 6560*
SURGERY, 6560*
SURVIVAL, 6560*
IMMUNITY
INTEGUMENTARY SYSTEM, 6315*
IMMUNOGLOBULINS
DEFICIENCY, 6319
INFLAMMATORY BOWEL DISEASES
DISEASES ASSOCIATED WITH, 6317*
LYMPHOCYTES, 6228
MUSCULOSKELETAL SYSTEM
DISEASES ASSOCIATED WITH, 6316
ETIOLOGY, 6317*
GENETICS, 6317*
PROGNOSIS
CHILD, 6556*
SALIVA
IMMUNOGLOBULINS, 6319
ZINC
DEFICIENCY, 6563*

CRUVEILHIER-BAUMGARTEN SYNDROME
SEE LIVER CIRRHOSIS

CYCLIC ADENOSINE MONOPHOSPHATE
SEE ADENOSINE CYCLIC 3',5'
MONOPHOSPHATE

CYSTIC FIBROSIS
BILIARY TRACT
OBSTRUCTION, 6332
HEPATITIS
DISEASES ASSOCIATED WITH, 6329
INFANT, 6329
INTESTINES
MUCUS, 6038
JAUNDICE, OBSTRUCTIVE
DISEASES ASSOCIATED WITH, 6329
INFANT, 6329

CYSTIC FIBROSIS (continued)
PANCREAS FUNCTION TESTS
URINE, 6061*

CYSTS
ABDOMEN
ADOLESCENCE, 6533
CHILD, 6533
ULTRASONOGRAPHY, 6533
DUODENUM
ETIOLOGY, 6239
PANCREATITIS, CHRONIC, 6239
ECHINOCOCCOSIS
SURGERY, 6548*
THERAPY, 6548*
LIVER
ANDROGENS, 6368*
DRUG-INDUCED, 6368*
ECHINOCOCCOSIS, 6548*
SURGERY, 6372, 6548*
THERAPY, 6548*
SALIVARY GLANDS, 6051
STOMACH
ENDOSCOPY, 6151
POLYPS, 6151
ULTRASONOGRAPHY
DIAGNOSIS, 6533

CYTOMEGALOVIRUSES
DIARRHEA
DISEASES ASSOCIATED WITH, 6547
IMMUNODEFICIENCY SYNDROME, 6547
IMMUNODEFICIENCY SYNDROME
DISEASES ASSOCIATED WITH, 6547

CYTOTOXICITY
HEMATOPOIESIS
ALCOHOLS, 6516
INTESTINE, SMALL
ALCOHOLS, 6516

DEGLUTITION DISORDERS
ACHALASIA, 6114
ESOPHAGUS
GRANULOMA, 6110
HIATAL HERNIA
SURGERY, 6103

DEHYDROGENASES
SEE OXIDOREDUCTASES

DIARRHEA
ANTIDIARRHEALS, 6534
CHILD
AMINO ACIDS, 6531
CYTOMEGALOVIRUSES
DISEASES ASSOCIATED WITH, 6547
IMMUNODEFICIENCY SYNDROME, 6547
DIET
THERAPY, 6531
DRUG-INDUCED
ANTIBIOTICS, 6501*
DRUG THERAPY, 6502*
ENTERITIS
INFANT, 6251*
ENTEROTOXINS
ESCHERICHIA COLI, 6530
ESCHERICHIA COLI
EPIDEMIOLOGY, 6530

DIARRHEA (continued)
FECES
STEROIDS, 6504*
GEOGRAPHICAL FACTORS
STEROIDS, 6504*
HORMONES, GASTROINTESTINAL
ETIOLOGY, 6505*
RADIOIMMUNOASSAY, 6505*
HYPOSPLENISM
ESCHERICHIA COLI, 6527
MALABSORPTION SYNDROMES
CHILD, 6531
MILK
PROTEINS, 6251*
PREVENTION, 6502*
ACIDS, 6017*
BACTERIA, 6503*
PROSTAGLANDINS
INFANT, 6528
PROTEIN-LOSING ENTEROPATHIES
CHILD, 6531
PYLORUS
SURGERY, 6153
STEROIDS
BACTERIA, 6504*
ETIOLOGY, 6504*
VAGOTOMY
SURGERY, 6153

DIET
COLITIS
FIBERS, 6303
THERAPY, 6303
COLON
DIVERTICULUM, 6303
CONSTIPATION
FIBERS, 6303
THERAPY, 6303
DIARRHEA
THERAPY, 6531
ENTERECTOMY, 6024
GASTRECTOMY
THERAPY, 6176
INFANT
PARENTERAL ALIMENTATION, 6535
INTESTINE, SMALL
FISTULA, 6233
KWASHIORKOR
BIOCHEMISTRY, 6254
INFANT, 6254
MALABSORPTION SYNDROMES
KWASHIORKOR, 6254
MARASMUS, 6254
THERAPY, 6531
MARASMUS
BIOCHEMISTRY, 6254
INFANT, 6254
PANCREAS
ABSCESS, 6333*
PROTEIN-LOSING ENTEROPATHIES
THERAPY, 6531

DIGESTION
CARBOHYDRATES
BLOOD, 6050
BODY COMPOSITION, 6050
METABOLISM, 6050
PHYSIOLOGY, 6050

DIGESTION (continued)
GASTRITIS
PROTEINS, 6209
GLUCOSE
BLOOD, 6050
BODY COMPOSITION, 6050
METABOLISM, 6050
PHYSIOLOGY, 6050
JEJUNUM
MOTILITY, 6023
STOMACH
ULCER, PEPTIC, 6209
ULCER, PEPTIC
PROTEINS, 6209

DISACCHARIDASES
CIRCADIAN RHYTHM
NEONATE, 6009*
INTESTINE, SMALL
CIRCADIAN RHYTHM, 6009*
NEONATE, 6009*

DISACCHARIDES
AMMONIA
METABOLISM, 6020*

DISTENTION
COLON
AGE FACTORS, 6310
DUODENUM
REFLUX, 6236

DIVERTICULITIS
CHOLECYSTITIS, 6498
COLON
SURGERY, 6305
THERAPY, 6305
SURGERY
COMPLICATIONS, 6305

DIVERTICULUM
COLON, 6306
DIET, 6303
FIBERS, 6303
THERAPY, 6303, 6304
DUODENUM
AGE FACTORS, 6238
BILIARY TRACT DISEASES, 6238
CHOLESTASIS, 6235
COMPLICATIONS, 6235
DISEASES ASSOCIATED WITH, 6238
PANCREATIC DISEASES, 6238
RADIOLOGY, 6238
ESOPHAGUS
ENDOSCOPY, 6132
FISTULA, 6133
RUPTURE, 6133

DIVERTICULUM, ZENKER'S
SEE ZENKER'S DIVERTICULUM

DRAINAGE
JAUNDICE, OBSTRUCTIVE
TECHNIQUES, 6473*
THERAPY, 6473*
PANCREAS
ABSCESS, 6333*
RECTUM
INCONTINENCE, 6270
SURGERY, 6270

DRUG DEPENDENCE
HEPATITIS, INFECTIOUS
AUSTRALIA ANTIGEN, 6434*

DRUG-INDUCED
BILIRUBIN
EXCRETION, 5973
CHOLESTASIS, 6487
COLITIS
ANTIBIOTICS, 6298
DRUG THERAPY, 6298
DIARRHEA
ANTIBIOTICS, 6501*
FATTY ACIDS
PROTEINS, 5975
FATTY LIVER
HYALIN SUBSTANCE, 6453*
STEROIDS, 6453*
HEPATITIS, NONVIRAL, 6419*
ANESTHETICS, 5967*
HEPATITIS, TOXIC
ANESTHETICS, 5967*
CHEMICAL PROPERTIES, 5967*
LIVER
CYSTS, 6368*
HYPERPLASIA, 6368*
NECROSIS, 5967*
NEOPLASMS, 6368*
LIVER COMA
ENDOTOXINS, 5987
LIVER INJURY, 6420*, 6422
ANESTHETICS, 5967*
HEPATITIS, TOXIC, 6423
NECROSIS, 6418*
PREVENTION, 6000
MALABSORPTION SYNDROMES, 6256

DRUG METABOLISM
BILE
PHENOBARBITAL, 5968*
HEPATOCYTES
BILE ACIDS AND SALTS, 5977
LIVER
ALCOHOLISM, 6447*
BILE ACIDS AND SALTS, 5977
BREATH TEST, 6541

DRUG THERAPY
CHOLELITHIASIS
CHENODEOXYCHOLIC ACID, 6482*
PHENOBARBITAL, 6482*
COLITIS
DRUG-INDUCED, 6298
COLON
FISTULA, 6187
COLONIC DISEASES, 6296
CROHN'S DISEASE, 6565
ANTIBIOTICS, 6566
IMMUNOSUPPRESSION, 6567
DIARRHEA, 6502*
DUMPING SYNDROME
HYPOGLYCEMIC AGENTS, 6152
DUODENUM
ULCER, PEPTIC, 6202*, 6203*, 6214, 6215
ESOPHAGEAL REFLUX
ESOPHAGITIS, 6096*
ESOPHAGITIS
H2 RECEPTOR ANTAGONISTS, 6096*

DRUG THERAPY (continued)
GASTRITIS, 6137*
H2 RECEPTOR ANTAGONISTS, 6190
HEMORRHAGE, 6190
REFLUX, 6188
TUBERCULOSIS, 6177
GASTROINTESTINAL SYSTEM
NEOPLASMS, 6513
HEPATITIS, CHRONIC, 6412
ILEUM
INFLAMMATION, 6246
JEJUNUM
INFLAMMATION, 6246
LIVER
NEOPLASMS, MALIGNANT, 6361*
REVIEW, 6401
LIVER CIRRHOSIS, 6412
LIVER COMA, 6466*
LIVER DISEASES, 6376, 6412, 6414
AUSTRALIA ANTIGEN, 6379
LIVER INJURY
NECROSIS, 6418*
LYMPHOMA
GASTROINTESTINAL SYSTEM, 6507*
PANCREATITIS
GLUCAGON, 6334*
PARASYMPATHOLYTICS, 6334*
STOMACH
FISTULA, 6187
ULCER, 6198
ULCER, PEPTIC, 6143*, 6144*
WOUNDS AND INJURIES, 6195
STOMACH DISEASES
H2 RECEPTOR ANTAGONISTS, 6212
TUBERCULOSIS
COMPLICATIONS, 6419*
ULCER, PEPTIC, 6211, 6216
ANTACIDS, 6144*
H2 RECEPTOR ANTAGONISTS, 6143*, 6144*, 6203*, 6212, 6213, 6214, 6215
TUBERCULOSIS, 6177
WILSON'S DISEASE
HEPATITIS, CHRONIC, 6370*

DRUG TOXICITY
LIVER
BINDING, 6424
METABOLISM, 6424
LIVER INJURY
HEPATITIS, 5974

DUBIN-JOHNSON SYNDROME
SEE JAUNDICE, CHRONIC IDIOPATHIC

DUMPING SYNDROME
HYPOGLYCEMIC AGENTS
DRUG THERAPY, 6152
PYLORUS
SURGERY, 6153
VAGOTOMY
SURGERY, 6153

DUODENITIS
DUODENUM
ULCER, PEPTIC, 6241
INFLAMMATION
LYMPHOCYTES, 6228
ULCER, PEPTIC
HEALING, 6241

DUODENOGRAPHY
VATER'S AMPULLA
BARIUM, 6237
NEOPLASMS, 6237

DUODENUM
SEE ALSO INTESTINE, SMALL
ABSORPTION
VITAMIN D, 6039
ACIDITY
ENZYMES, 6200*
ANOMALY
PANCREATITIS, CHRONIC, 6347
BICARBONATE SECRETION
ACIDITY, 6028
BILE ACIDS AND SALTS
ACIDITY, 6200*
ENZYMES, 6200*
BLEEDING
DISEASES ASSOCIATED WITH, 6197
LASER, 6045*
THERAPY, 6045*
CHILD
ENDOSCOPY, 6543
CYSTS
ETIOLOGY, 6239
PANCREATITIS, CHRONIC, 6239
DIVERTICULUM
AGE FACTORS, 6238
BILIARY TRACT DISEASES, 6238
CHOLESTASIS, 6235
COMPLICATIONS, 6235
DISEASES ASSOCIATED WITH, 6238
PANCREATIC DISEASES, 6238
RADIOLOGY, 6238
ENTEROKINASE, 6010*
ENTEROPEPTIDASE
GASTROINTESTINAL DISEASES, 6338*
HEMORRHAGE
ALCOHOLS, 6102
ASPIRIN, 6102
EMBOLIZATION, 6168
ULCER, PEPTIC, 6102
HERNIA
LAPAROTOMY, 6245
OBSTRUCTION, 6245
SURGERY, 6245
HORMONES
ANESTHETICS, 6031
INFANT
ENDOSCOPY, 6543
INFLAMMATION
DISEASES ASSOCIATED WITH, 6197
LIPIDS, 6012*
ODDI'S SPHINCTER
REFLUX, 6236
PANCREATITIS, CHRONIC
COMPLICATIONS, 6347
PHOSPHOLIPIDS, 6012*
POLYPS
SURGERY, 6121
REFLUX
DISTENTION, 6236
ULCER, PEPTIC
DIAGNOSIS, 6202*
DISEASES ASSOCIATED WITH, 6241
DRUG THERAPY, 6202*, 6203*, 6214, 6215
DUODENITIS, 6241

DUODENUM (continued)
ULCER, PEPTIC (continued)
H2 RECEPTOR ANTAGONISTS, 6203*, 6214, 6215
HEALING, 6215
RADIOLOGY, 6202*
REVIEW, 6202*
SURGERY, 6202*

DYSKINESIA
SEE MOVEMENT DISORDERS

DYSPEPSIA
CHOLELITHIASIS
RADIOLOGY, 6480*

DYSPHAGIA
SEE DEGLUTITION DISORDERS

ECHINOCOCCOSIS
CYSTS
SURGERY, 6548*
THERAPY, 6546*
LIVER
CYSTS, 6548*

ECHOGRAPHY
SEE ULTRASONOGRAPHY

EDEMA
LIVER COMA
COMPLICATIONS, 6363*
LIVER DISEASES
COMPLICATIONS, 6363*

ELECTROLYTES
CECUM
SECRETION, 6021

ELECTROPHORESIS
HEPATITIS, INFECTIOUS
ANTIGENS, 6437

ELECTROPHYSIOLOGY
IRRITABLE COLON
FOOD, 6263*
PARASYMPATHOLYTICS, 6263*
LIVER
CELLS, 5983

EMESIS
SEE VOMITING

EMPHYSEMA
ESOPHAGUS
ENDOSCOPY, 6058*
INTESTINE, SMALL
ENDOSCOPY, 6058*
STOMACH
ENDOSCOPY, 6058*

ENDOCRINE DISEASES
FAMILIAL FACTORS, 6509*
ZOLLINGER-ELLISON SYNDROME
DISEASES ASSOCIATED WITH, 6509*

ENDOCRINE SYSTEM
GASTRIN
CALCIUM, 6510
NEOPLASMS
GASTRIN, 6510
PANCREATITIS
HOMEOSTASIS, 6337*
STRESS, 6337*

ENDOSCOPY
AMYLASES
REVIEW, 6067*
BILE DUCTS
OBSTRUCTION, 6471*
BILIARY TRACT
NEOPLASMS, 6328
BILIARY TRACT DISEASES, 6092
BLEEDING
GASTROINTESTINAL SYSTEM, 6057*
COLON
TECHNIQUES, 6266
COLONIC DISEASES
DIAGNOSIS, 6264
COMMON BILE DUCT
PANCREATIC DUCT, 6472*
DUODENUM
CHILD, 6543
INFANT, 6543
ESOPHAGUS
ACHALASIA, 6131
CHILD, 6543
DIVERTICULUM, 6132
EMPHYSEMA, 6058*
IATROGENESIS, 6109
INFANT, 6543
OBSTRUCTION, 6131
SPHINCTER, 6122
STRICTURE, 6130
VARICES, 6104
GASTROINTESTINAL SYSTEM
FOREIGN BODIES, 6099
HEMORRHAGE, 6073, 6081
HEMORRHAGE
ESOPHAGUS, 6057*
GASTROINTESTINAL SYSTEM, 6057*
INTESTINE, SMALL, 6057*
STOMACH, 6057*
INTESTINE, SMALL
EMPHYSEMA, 6058*
GARDNER'S SYNDROME, 6243
JAUNDICE, OBSTRUCTIVE, 6471*
ODDI'S SPHINCTER
COMMON BILE DUCT, 6069
REVIEW, 6069
TECHNIQUES, 6069
PANCREAS
ABSCESS, 6330
NEOPLASMS, 6328
PANCREATIC DISEASES, 6092
STOMACH
CHILD, 6543
CYSTS, 6151
EMPHYSEMA, 6058*
INFANT, 6543
NEOPLASMS, MALIGNANT, 6135*, 6165, 6182
POLYPS, 6151
TECHNIQUES, 6182
ULCER, PEPTIC, 6205

ENDOSCOPY (continued)
ULCER, PEPTIC
DIAGNOSIS, 6205
HEALING, 6215

ENDOTOXINS
ADENOSINE TRIPHOSPHATASE
BACTERIA, 5978
CHOLESTASIS
BACTERIA, 5978
LIVER
ADENOSINE TRIPHOSPHATASE, 5978
METABOLISM, 5994
STEROIDS, 5994
LIVER COMA
DRUG-INDUCED, 5987
LIVER INJURY, 5964*

ENEMA
HERNIA
BARIUM, 6229

ENTERECTOMY
DIET, 6024
VITAMIN D
METABOLISM, 6561*

ENTERITIS
INFANT
DIARRHEA, 6251*
LACTOSE INTOLERANCE, 6251*
SHUNT, INTESTINAL
COMPLICATIONS, 6225*
PREVENTION, 6225*
SURGERY, 6225*
THERAPY, 6225*

ENTEROCOLITIS, NECROTIZING
NEONATE
THERAPY, 6519

ENTEROKINASE
DUODENUM, 6010*

ENTEROPEPTIDASE
DUODENUM
GASTROINTESTINAL DISEASES, 6338*

ENTEROSTOMY
INTESTINAL OBSTRUCTION
PHYSIOLOGY, 6035

ENTEROTOXINS
DIARRHEA
ESCHERICHIA COLI, 6530

EOSINOPHILS
ILEITIS
GEOGRAPHICAL FACTORS, 6223*
PARASITES AND PARASITIC DISEASES, 6223*

ERYTHROCYTES
LIVER DISEASES
LIPIDS, 6377

ESCHERICHIA COLI
DIARRHEA
ENTEROTOXINS, 6530
EPIDEMIOLOGY, 6530
HYPOSPLENISM, 6527

ESOPHAGEAL DISEASES
CONNECTIVE TISSUE
ANTIBODIES, 6499*

ESOPHAGEAL REFLUX
ALKALIS, 6141*
CHILD
DISEASES ASSOCIATED WITH, 6117
FEEDING, 6116
DISEASES ASSOCIATED WITH
RESPIRATORY SYSTEM, 6117
ESOPHAGITIS
CHILD, 6120
DRUG THERAPY, 6096*
H2 RECEPTOR ANTAGONISTS, 6096*
SURGERY, 6120
THERAPY, 6120
HIATAL HERNIA
CHILD, 6120
SURGERY, 6120
THERAPY, 6120
INFANT
DISEASES ASSOCIATED WITH, 6117
PATHOLOGY
HISTOLOGY, 6123
STOMACH
CHILD, 6116
ESOPHAGITIS, 6120
HIATAL HERNIA, 6120
SURGERY, 6115

ESOPHAGITIS
DRUG THERAPY
H2 RECEPTOR ANTAGONISTS, 6096*
ESOPHAGEAL REFLUX
CHILD, 6120
DRUG THERAPY, 6096*
H2 RECEPTOR ANTAGONISTS, 6096*
STOMACH, 6120
SURGERY, 6120
THERAPY, 6120
ESOPHAGUS
SURGERY, 6097
ETIOLOGY
ALKALIS, 6141*
GASTRECTOMY
COMPLICATIONS, 6147
RADIONUCLIDES
MARKER STUDY, 6156
REFLUX
SURGERY, 6113

ESOPHAGUS
ACHALASIA
DILATATION, 6131
ENDOSCOPY, 6131
THYROCALCITONIN, 6118
ATRESIA
DISEASES ASSOCIATED WITH, 6105
INFANT, 6112
RESPIRATORY SYSTEM, 6105
SURGERY, 6112
THERAPY, 6128

ESOPHAGUS (continued)
BARIUM
TECHNIQUES, 6056*
BARRETT'S SYNDROME
PRECANCEROUS CONDITIONS, 6098
BLEEDING
REVIEW, 6127
CHILD
ENDOSCOPY, 6543
DIVERTICULUM
ENDOSCOPY, 6132
RUPTURE, 6133
EMPHYSEMA
ENDOSCOPY, 6058*
FISTULA
DIVERTICULUM, 6133
INFANT, 6106
PREMATURITY, 6106
THERAPY, 6128
GRANULOMA
DEGLUTITION DISORDERS, 6110
HEMORRHAGE
ALCOHOLS, 6102
ASPIRIN, 6102
ENDOSCOPY, 6057*
ULCER, PEPTIC, 6102
HIATAL HERNIA
SURGERY, 6111
HYPERTENSION, PORTAL
VARICES, 6468
IATROGENESIS
ENDOSCOPY, 6109
INFANT
ENDOSCOPY, 6543
MORPHOLOGY
BARIUM, 6056*
NEOPLASMS, MALIGNANT, 6098
DIAGNOSIS, 6129, 6183
OBSTRUCTION
ENDOSCOPY, 6131
PERFORATION
DIAGNOSIS, 6101
REVIEW, 6101
SURGERY, 6101
POLYPS
SURGERY, 6121
SPHINCTER
ACHALASIA, 6118
DRUG EFFECTS ON, 6125
ENDOSCOPY, 6122
FOOD, 6125
HIATAL HERNIA, 6125
HORMONE EFFECTS ON, 6125
HYPERTENSION, 6126
THYROCALCITONIN, 6118
STOMACH
BLEEDING, 6127
OBSTRUCTION, 6131
STRICTURE
DILATATION, 6124, 6130
ENDOSCOPY, 6130
GASTRECTOMY, 6147
THERAPY, 6124
SURGERY
COMPLICATIONS, 6097
ESOPHAGITIS, 6097
VARICES
ENDOSCOPY, 6104
THERAPY, 6104, 6458, 6467

ESTROGENS
LIVER
BINDING, 6004

EXCRETION
BILE
BILIRUBIN, 5973
BILIRUBIN
DRUG-INDUCED, 5973
GALACTOSE
KINETICS, 5976
LIVER
GALACTOSE, 5976
PORPHYRIA
HEME, 6384

FASCIOLIASIS
BILE DUCTS
HYPERPLASIA, 5998

FATS
SEE ALSO TRIGLYCERIDES
COLON
BACTERIA, 6018*
MOTILITY, 6018*
FECES
BACTERIA, 6018*
INTESTINE, LARGE
BACTERIA, 6018*
MOTILITY, 6018*
NEOPLASMS, MALIGNANT, 6018*
INTESTINES
MOTILITY, 6018*
OBESITY
SHUNT, INTESTINAL, 6224*
SECRETION
SECRETIN, 6019*
SHUNT, INTESTINAL
INTESTINAL ABSORPTION, 6224*

FATTY ACIDS
HYPOXIA
METABOLISM, 5999
JEJUNUM
METABOLISM, 6219*
TRACER STUDY, 6219*
LIVER
HYPOXIA, 5999
PROTEINS, 5975
PROTEINS
DRUG-INDUCED, 5975

FATTY LIVER
CHILD
ETIOLOGY, 6456*
REVIEW, 6456*
THERAPY, 6456*
DRUG-INDUCED
STEROIDS, 6453*
HYALIN SUBSTANCE
DRUG-INDUCED, 6453*
JAUNDICE
PREGNANCY, 6367*
LIVER DISEASES, ALCOHOLIC
PATHOLOGY, 6450*
SERUM
ALBUMINS, 6406
IMMUNOGLOBULINS, 6406
PROTEINS, 6406
VITAMIN A, 5970*

FECES
AMMONIA
METABOLISM, 6020*
BACTERIA
DIETARY FACTORS, 6018*
FATS, 6018*
DIARRHEA
STEROIDS, 6504*
GASTROENTERITIS
VIRUSES, 6517

FEEDING
ESOPHAGEAL REFLUX
CHILD, 6116

FETOPROTEIN, ALPHA
SEE ALPHA FETOPROTEIN

FIBERS
CHOLELITHIASIS
DIETARY FACTORS, 5962*
COLITIS
DIET, 6303
THERAPY, 6303
COLON
DIVERTICULUM, 6303
CONSTIPATION
DIET, 6303
THERAPY, 6303

FIBRINOLYSIS
HEPATITIS, INFECTIOUS
PREGNANCY, 6439

FISTULA
ANUS
REVIEW, 6311
SURGERY, 6311
THERAPY, 6311
AORTA
HEMORRHAGE, 6518
COLON
DRUG THERAPY, 6187
HEALING, 6187
ESOPHAGUS
DIVERTICULUM, 6133
INFANT, 6106
PREMATURITY, 6106
THERAPY, 6128
HEMORRHAGE
THERAPY, 6518
INTESTINE, SMALL
DIET, 6233
NUTRITION, 6233
SURGERY, 6234
THERAPY, 6233, 6234
INTESTINES
ETIOLOGY, 6232
PROGNOSIS, 6232
REVIEW, 6232
THERAPY, 6232
STOMACH
DRUG THERAPY, 6187
HEALING, 6187

FLUID BALANCE
SEE WATER, ELECTROLYTE BALANCE

FOLIC ACID
MENETRIER'S DISEASE
DEFICIENCY, 6139*

FOOD
ESOPHAGUS
SPHINCTER, 6125
IRRITABLE COLON
ELECTROPHYSIOLOGY, 6263*
MOTILITY, 6263*

FOREIGN BODIES
GASTROINTESTINAL SYSTEM
ENDOSCOPY, 6099

FUNGUS DISEASES
SEE MYCOSES

GALACTOSE
EXCRETION
KINETICS, 5976
LIVER
CLEARANCE STUDY, 5965*
EXCRETION, 5976
PERFUSION, 5976

GALLBLADDER
ANOMALY
ULTRASONOGRAPHY, 6495
BILE
DIETARY FACTORS, 5962*
PREGNANCY, 6476*
BILE ACIDS AND SALTS
PREGNANCY, 6476*
CALCIFICATION
DIAGNOSIS, 6479*
NEOPLASMS, MALIGNANT, 6479*
JAUNDICE, OBSTRUCTIVE
DIAGNOSIS, 6485
ULTRASONOGRAPHY, 6485
NEOPLASMS, 6484
OBSTRUCTION
RADIOLOGY, 6493
PERFORATION
ULTRASOUND, 6001
STOMACH
ANOMALY, 6497
ULTRASOUND
BILE, 6001

GALLBLADDER DISEASES
CHOLANGIOGRAPHY
DIAGNOSIS, 6082
ULTRASOUND
DIAGNOSIS, 6082

GALLIUM
ABDOMEN
SCANNING, SCINTILLATION, 6072

GARDNER'S SYNDROME
INTESTINE, SMALL
DIAGNOSIS, 6243
ENDOSCOPY, 6243

GASES
LIVER
GASTROINTESTINAL DISEASES, 6364*
VEINS, 6364*

GASTRECTOMY
ANTRUM
COMPLICATIONS, 6134*
COMPLICATIONS
RADIOISOTOPES, 6134*
ZOLLINGER-ELLISON SYNDROME, 6134*
DIET
THERAPY, 6176
ESOPHAGITIS
COMPLICATIONS, 6147
ESOPHAGUS
STRICTURE, 6147
PARENTERAL ALIMENTATION
THERAPY, 6176
STOMACH
NEOPLASMS, 6146, 6147

GASTRIC INHIBITORY POLYPEPTIDE
SEE HORMONES, GASTROINTESTINAL

GASTRIN
ANTIBODIES
RADIOIMMUNOASSAY, 6078
ANTRUM
ACHLORHYDRIA, 6181
ENDOCRINE SYSTEM
CALCIUM, 6510
NEOPLASMS, 6510
LIVER
TRANSPORT, 5956*
SERUM, 6191
ACHLORHYDRIA, 6181
ARTHRITIS, 6192
STOMACH
ACHLORHYDRIA, 6181
SECRETION, 6178
ULCER, PEPTIC, 6193

GASTRITIS
ANEMIA
FAMILIAL FACTORS, 6155
DIGESTION
PROTEINS, 6209
DRUG THERAPY, 6137*
H2 RECEPTOR ANTAGONISTS, 6190
HEMORRHAGE
DRUG THERAPY, 6190
H2 RECEPTOR ANTAGONISTS, 6190
IMMUNOLOGY, 6136*
PATHOLOGY, 6137*
REFLUX
CHOLESTYRAMINE, 6188
DRUG THERAPY, 6188
STOMACH
CYTOLOGY, 6172
SURGERY
TECHNIQUES, 6173
TUBERCULOSIS
DRUG THERAPY, 6177

GASTRITIS, ATROPHIC
IMMUNOLOGY, 6136*
STOMACH
ENZYMES, 6189
MORPHOLOGY, 6189

GASTRODUODENAL ULCER
SEE ULCER, PEPTIC

GASTROENTERITIS
BREAST FEEDING
PREVENTION, 6546
CARBOHYDRATES
INTOLERANCE, 6536
FECES
VIRUSES, 6517
INFANT
CARBOHYDRATES, 6536
INTESTINAL OBSTRUCTION
DISEASES ASSOCIATED WITH, 6506*
VIRUS DISEASES
EPIDEMIOLOGY, 6529
INFANT, 6529
PATHOLOGY, 6529
VIRUSES
CHILD, 6517

GASTROINTESTINAL DISEASES
ANTIBODIES
AGE FACTORS, 6499*
ANTIGENS
DISEASES ASSOCIATED WITH, 6520
COMPLICATIONS
ARTHRITIS, 6273
DIAGNOSIS
ANGIOGRAPHY, 6086
TECHNIQUES, 6084
DUODENUM
ENTEROPEPTIDASE, 6338*
INFANT
PARENTERAL ALIMENTATION, 6535
LIVER
GASES, 6364*
MUCUS
CHEMICAL COMPOSITION, 6523
GLYCOPROTEINS, 6523
SECRETION, 6524, 6525
SYNTHESIS, 6524
VIRUSES
ACIDITY, 6047
NEONATE, 6047
PREVENTION, 6047
PROTEOLYSIS, 6047
SIMULATION, 6047

GASTROINTESTINAL SYSTEM
BLEEDING
ENDOSCOPY, 6057*
LASER, 6045*
THERAPY, 6042*, 6045*
FOREIGN BODIES
ENDOSCOPY, 6099
HEMORRHAGE
DIAGNOSIS, 6073, 6081
ENDOSCOPY, 6057*, 6073, 6081
PROGNOSIS, 6057*
REVIEW, 6073
THERAPY, 6073
LYMPHOMA
DIAGNOSIS, 6507*
DRUG THERAPY, 6507*
SURGERY, 6507*
NEOPLASM METASTASIS
SEX FACTORS, 6500*
NEOPLASMS
CALCIFICATION, 6508*
DRUG THERAPY, 6513

GASTROINTESTINAL SYSTEM (continued)
NEOPLASMS, MALIGNANT
CARCINOEMBRYONIC ANTIGEN, 6088
INTEGUMENTARY SYSTEM, 6540
PERMEABILITY
CELIAC DISEASE, 6250*
PRECANCEROUS CONDITIONS
INTEGUMENTARY SYSTEM, 6540
RADIATION
REVIEW, 6521
WOUNDS AND INJURIES, 6521
RADIATION EFFECTS ON
COMPLICATIONS, 6521
SURGERY, 6521
SURVIVAL, 6521
RADIOLOGY
CONTRAST MEDIA, 6085
RADIOTHERAPY
RADIATION EFFECTS ON, 6521

GENETICS
BILIRUBIN
METABOLISM, 6416
COLITIS, ULCERATIVE
MUSCULOSKELETAL SYSTEM, 6317*
CROHN'S DISEASE
MUSCULOSKELETAL SYSTEM, 6317*
INFLAMMATORY BOWEL DISEASES
MUSCULOSKELETAL SYSTEM, 6317*

GIARDIASIS
AGE FACTORS, 6552
SEX FACTORS, 6552

GILBERT'S DISEASE
HYBERBILIRUBINEMIA
SIMULATION, 5989

GLOBULINS
HEPATITIS, CHRONIC
COMPLICATIONS, 6445*
DISEASES ASSOCIATED WITH, 6445*

GLUCAGON
PANCREATITIS
DRUG THERAPY, 6334*
PARASYMPATHOLYTICS, 6334*

GLUCOSE
ABSORPTION, 6050
DIGESTION
BLOOD, 6050
BODY COMPOSITION, 6050
METABOLISM, 6050
PHYSIOLOGY, 6050

GLUTATHIONE
URINE
CLEARANCE STUDY, 6053

GLYCOPROTEINS
COLON
MORPHOLOGY, 6011*
GASTROINTESTINAL DISEASES
MUCUS, 6523
INTESTINE, SMALL
ENZYMES, 6029
MEMBRANES, 6029

GRANULOMA
ESOPHAGUS
DEGLUTITION DISORDERS, 6110
SCHISTOSOMIASIS
SIMULATION, 5972*

H2 RECEPTOR ANTAGONISTS
DUODENUM
ULCER, PEPTIC, 6203*, 6214, 6215
ESOPHAGEAL REFLUX
ESOPHAGITIS, 6096*
ESOPHAGITIS
DRUG THERAPY, 6096*
GASTRITIS
DRUG THERAPY, 6190
HEMORRHAGE, 6190
SECRETION
INTRINSIC FACTOR, 6204*
STOMACH
ACID SECRETION, 6204*
INTRINSIC FACTOR, 6204*
ULCER, 6157
ULCER, PEPTIC, 6143*, 6144*
WOUNDS AND INJURIES, 6195
STOMACH DISEASES
DRUG THERAPY, 6212
ULCER
HEMORRHAGE, 6108
ULCER, PEPTIC
DRUG THERAPY, 6143*, 6144*, 6203*, 6212, 6213, 6214, 6215
HEMORRHAGE, 6108

HEMATIN
SEE HEME

HEMATOPOIESIS
CYTOTOXICITY
ALCOHOLS, 6516

HEME
PORPHYRIA
BILE, 6384
BILIRUBIN, 6384
EXCRETION, 6384
PORPHYRINS, 6384

HEMOCHROMATOSIS
DIAGNOSIS, 6394
IRON
CLEARANCE STUDY, 6373
METABOLISM, 6399
LIVER
IRON, 6373
PROGNOSIS, 6394
REVIEW, 6399

HEMODIALYSIS
LIVER COMA
MEMBRANES, 6382
PERMEABILITY, 6382
STOMACH
ACID SECRETION, 6140*
PERMEABILITY, 6140*

HEMOLYSIS
UREMIA
DISEASES ASSOCIATED WITH, 6514

HEMORRHAGE
SEE ALSO BLEEDING
AORTA
FISTULA, 6518
DUODENUM
ALCOHOLS, 6102
ASPIRIN, 6102
EMBOLIZATION, 6168
ULCER, PEPTIC, 6102
EMBOLIZATION
TECHNIQUES, 6168
ESOPHAGUS
ALCOHOLS, 6102
ASPIRIN, 6102
ENDOSCOPY, 6057*
ULCER, PEPTIC, 6102
FISTULA
THERAPY, 6518
GASTRITIS
DRUG THERAPY, 6190
H2 RECEPTOR ANTAGONISTS, 6190
GASTROINTESTINAL SYSTEM
DIAGNOSIS, 6073, 6081
ENDOSCOPY, 6057*, 6073, 6081
PROGNOSIS, 6057*
REVIEW, 6073
THERAPY, 6073
INTESTINE, SMALL
ENDOSCOPY, 6057*
LIVER INJURY
ETIOLOGY, 6421*
PREVENTION, 6421*
PROTHROMBIN, 6421*
REVIEW, 6421*
THERAPY, 6421*
RADIOISOTOPES
DIAGNOSIS, 6089
TECHNIQUES, 6089
STOMACH
ALCOHOLS, 6102
ASPIRIN, 6102
EMBOLIZATION, 6168
ENDOSCOPY, 6057*
ULCER, PEPTIC, 6102
ULCER
H2 RECEPTOR ANTAGONISTS, 6108
ULCER, PEPTIC
H2 RECEPTOR ANTAGONISTS, 6108

HEMOSTASIS
LIVER INJURY
REVIEW, 6375

HEPATECTOMY
LIVER COMA
AMMONIA, 5981
BACTERIA, 5981

HEPATIC VEIN THROMBOSIS
SEE ALSO BUDD-CHIARI SYNDROME
CONTRACEPTIVES, ORAL, 6388

HEPATITIS
ALPHA FETOPROTEIN, 6351*
ANTIGENS
CHROMATOGRAPHY, 6435*
CYSTIC FIBROSIS
DISEASES ASSOCIATED WITH, 6329
INFANT, 6329

HEPATITIS (continued)
IMMUNOLOGY, 6431*
LIVER DISEASES, ALCOHOLIC
HYALIN SUBSTANCE, 6457
HYPERSENSITIVITY, 6455*
IMMUNOLOGY, 6455*
PATHOLOGY, 6454*
LIVER INJURY
DRUG TOXICITY, 5974
NEONATE
IMMUNITY, 6430*
PREVENTION, 6430*
REYE'S SYNDROME
DISEASES ASSOCIATED WITH, 6387
SERUM
ALBUMINS, 6406
IMMUNOGLOBULINS, 6406
PROTEINS, 6406
UREA
ENZYMES, 6448*
METABOLISM, 6448*

HEPATITIS, CHRONIC
ANTIBODIES, 6443*
ANTIGENS
RADIOIMMUNOASSAY, 5995
AUSTRALIA ANTIGEN, 6441*
BLOOD
AMINES, 6413
CLASSIFICATION
REVIEW, 6440*
COMPLICATIONS
ANEMIA, HEMOLYTIC, 6444*
BACTERIAL INFECTIONS, 6444*
GLOBULINS, 6445*
SEPSIS, 6444*
DISEASES ASSOCIATED WITH
GLOBULINS, 6445*
DRUG THERAPY, 6412
ETIOLOGY
VIRUSES, 6425*
IMMUNOLOGY, 6358*, 6431*
IMMUNOTHERAPY
PROGNOSIS, 6442*
LYMPHOCYTES, 6446
PATHOLOGY
REVIEW, 6440*
UREA
ENZYMES, 6448*
METABOLISM, 6448*
URINE
AMINES, 6413
WILSON'S DISEASE
DIAGNOSIS, 6370*
DRUG THERAPY, 6370*
PROGNOSIS, 6370*
SIMULATION, 6370*

HEPATITIS, CHRONIC INTERSTITIAL
SEE LIVER CIRRHOSIS

HEPATITIS, INFECTIOUS
ANTIGENS
CHROMATOGRAPHY, 6435*
ELECTROPHORESIS, 6437
RADIOIMMUNOASSAY, 5995
AUSTRALIA ANTIGEN
AGE FACTORS, 6434*
ASSAY, 6438

HEPATITIS, INFECTIOUS (continued)
AUSTRALIA ANTIGEN (continued)
DRUG DEPENDENCE, 6434*
RISK FACTORS, 6434*
TRANSFUSION, 6434*, 6436
TRANSMISSION, 6436
BLOOD PLATELETS
PREVENTION, 6429*
TRANSFUSION, 6429*
TRANSMISSION, 6429*
ETIOLOGY, 6427*
VIRUSES, 6425*
IMMUNOLOGY, 6431*
JAUNDICE
PREGNANCY, 6367*
LIVER COMA
ETIOLOGY, 6374
PREGNANCY
CLOTTING, 6439
FIBRINOLYSIS, 6439
REVIEW, 6397
THALASSEMIA
EPIDEMIOLOGY, 6426*
TRANSMISSION, 6426*
TRANSFUSION
THALASSEMIA, 6426*
TRANSMISSION, 6427*
OCCUPATIONAL FACTORS, 6436
RISK FACTORS, 6436
TRANSFUSION, 6436

HEPATITIS, NONVIRAL
ANESTHETICS
CHEMICAL PROPERTIES, 5967*
BACTERIAL INFECTIONS, 6417*
DRUG-INDUCED, 6419*
ANESTHETICS, 5967*

HEPATITIS, SERUM
NEONATE
IMMUNITY, 6430*
PREVENTION, 6430*

HEPATITIS, TOXIC
DRUG-INDUCED
ANESTHETICS, 5967*
CHEMICAL PROPERTIES, 5967*
LIVER INJURY
DRUG-INDUCED, 6423
REVIEW, 6397

HEPATITIS, VIRAL
SEE HEPATITIS, INFECTIOUS

HEPATOCYTES
ALCOHOLS
OXIDATION, 5955*
BINDING
ALKALOIDS, 5990
CELL CULTURE
HORMONES, 5988
HORMONES, GASTROINTESTINAL, 5988
CHOLESTEROL
SYNTHESIS, 5991
DRUG EFFECTS ON
ULTRASTRUCTURE, 5985
DRUG METABOLISM
BILE ACIDS AND SALTS, 5977

HEPATOCYTES (continued)
DRUGS
TRANSPORT, 5977
HORMONES
PANCREAS, 5988
LIVER
NEOPLASMS, 6385
WOUNDS AND INJURIES
TRYPSIN, 6000

HEPATOLENTICULAR DEGENERATION
SEE WILSON'S DISEASE

HERNIA
ABDOMEN
DIAGNOSIS, 6229
RADIOLOGY, 6229
BARIUM
ENEMA, 6229
CONSTIPATION
DISEASES ASSOCIATED WITH, 6242
DUODENUM
LAPAROTOMY, 6245
OBSTRUCTION, 6245
SURGERY, 6245
INTESTINE, SMALL
OBSTRUCTION, 6242

HERNIA, HIATUS
SEE HIATAL HERNIA

HIATAL HERNIA
ESOPHAGEAL REFLUX
CHILD, 6120
STOMACH, 6120
SURGERY, 6120
THERAPY, 6120
ESOPHAGUS
SPHINCTER, 6125
SURGERY, 6111
RADIONUCLIDES
MARKER STUDY, 6156
SURGERY
COMPLICATIONS, 6103
DEGLUTITION DISORDERS, 6103
TECHNIQUES, 6100, 6111

HIRSCHSPRUNG'S DISEASE
INTESTINE, LARGE
CELLS, 6262*
HISTOCHEMISTRY, 6262*
IMMUNOLOGY, 6262*

HORMONE CONTROL
INTESTINE, SMALL
CELLS, 6037
MITOSIS, 6037
MOTILITY, 6025
PARENTERAL ALIMENTATION
METABOLISM, 6043*
STOMACH
SECRETION, 6178

HORMONES
DUODENUM
ANESTHETICS, 6031
HEPATOCYTES
CELL CULTURE, 5988

HORMONES (continued)
INTESTINES
SYNTHESIS, 6032
JAUNDICE
PREGNANCY, 6367*
LIVER COMA
HYPOTENSION, 6380
RENIN, 6380
SODIUM, 6380
PANCREAS
HEPATOCYTES, 5988

HORMONES, GASTROINTESTINAL
DIARRHEA
ETIOLOGY, 6505*
RADIOIMMUNOASSAY, 6505*
HEPATOCYTES
CELL CULTURE, 5988

HYALIN SUBSTANCE
FATTY LIVER
DRUG-INDUCED, 6453*
LIVER DISEASES, ALCOHOLIC
HEPATITIS, 6457

HYBERBILIRUBINEMIA
GILBERT'S DISEASE
SIMULATION, 5939

HYPERLIPOPROTEINEMIA
BILE
LIPIDS, 6365*
CHENODEOXYCHOLIC ACID, 6365*
SERUM
LIPIDS, 6365*

HYPERPLASIA
FASCIOLIASIS
BILE DUCTS, 5998
INTESTINE, SMALL
BILE, 5996
LIVER
ANDROGENS, 6368*
DRUG-INDUCED, 6368*

HYPERSENSITIVITY
LIVER DISEASES, ALCOHOLIC
HEPATITIS, 6455*
MILK
IMMUNOLOGY, 6253
INFANT, 6253

HYPERTENSION
ESOPHAGUS
SPHINCTER, 6126
PANCREATITIS
PROGNOSIS, 6348

HYPERTENSION, PORTAL
ASCITES
REVIEW, 6467
ESOPHAGUS
VARICES, 6468
ETIOLOGY
REVIEW, 6467
LIVER
SCHISTOSOMIASIS, 6553
LIVER COMA
REVIEW, 6467

HYPERTENSION, PORTAL (continued)
PATHOLOGY
REVIEW, 6467
PHYSIOLOGY
REVIEW, 6467
SURGERY
REVIEW, 6467
VARICES
BLEEDING, 6468
SURGERY, 6468
THERAPY, 6467, 6468

HYPERTROPHY
OBESITY
VILLI, 6224*

HYPOGLYCEMIC AGENTS
DUMPING SYNDROME
DRUG THERAPY, 6152

HYPOSPLENISM
DIARRHEA
ESCHERICHIA COLI, 6527

HYPOTENSION
LIVER COMA
HORMONES, 6380

HYPOXIA
FATTY ACIDS
METABOLISM, 5999
LIVER
FATTY ACIDS, 5999
LIVER CIRRHOSIS
COMPLICATIONS, 6459*
ETIOLOGY, 6459*

ICTERUS
SEE JAUNDICE

ILEITIS
EOSINOPHILS
GEOGRAPHICAL FACTORS, 6223*
PARASITES AND PARASITIC DISEASES, 6223*

ILEUM
SEE ALSO INTESTINE, SMALL
CHOLESTEROL
SYNTHESIS, 6007*
CROHN'S DISEASE
BREATH TEST, 6558*
MORPHOLOGY, 6558*
PHYSIOLOGY, 6558*
PROGNOSIS, 6560*
RADIOLOGY, 6558*
RECURRENCE, 6560*
REVIEW, 6560*
SURGERY, 6560*
SURVIVAL, 6560*
INFLAMMATION
DIAGNOSIS, 6246
DRUG THERAPY, 6246
SURGERY, 6246
JEJUNUM
INFLAMMATION, 6246
MITOSIS
BILE, 6015*
STENOSIS, 6227

ILEUM (continued)
STOMACH
MOTILITY, 6022
SECRETION, 6022
URINARY SYSTEM
SURGERY, 6227
VITAMIN D
PHOSPHATE, 6030
STEROLS, 6030

ILEUS
SEE INTESTINAL OBSTRUCTION

IMMUNITY
COLITIS, ULCERATIVE
INTEGUMENTARY SYSTEM, 6315*
SURGERY, 6315*
CROHN'S DISEASE
INTEGUMENTARY SYSTEM, 6315*
HEPATITIS
NEONATE, 6430*
HEPATITIS, SERUM
NEONATE, 6430*
INFLAMMATORY BOWEL DISEASES
FAMILIAL FACTORS, 6315*
INTEGUMENTARY SYSTEM, 6315*
PATHOLOGY, 6314*

IMMUNOGLOBULINS
COLITIS, ULCERATIVE
DEFICIENCY, 6319
SALIVA, 6319
CROHN'S DISEASE
DEFICIENCY, 6319
SALIVA, 6319
INFLAMMATORY BOWEL DISEASES
DEFICIENCY, 6319
SALIVA, 6319
SERUM, 6313*
INTESTINES
NEOPLASMS, MALIGNANT, 6295
LIVER DISEASES
LYMPHOCYTES, 6383
SYNTHESIS, 6383
PARASITES AND PARASITIC DISEASES, 6551
SERUM
FATTY LIVER, 6406
HEPATITIS, 6406
LIVER CIRRHOSIS, 6406
LIVER DISEASES, 6406

IMMUNOSUPPRESSION
CROHN'S DISEASE
DRUG THERAPY, 6567
LIVER DISEASES
AUSTRALIA ANTIGEN, 6379

IMMUNOTHERAPY
HEPATITIS, CHRONIC
PROGNOSIS, 6442*

INCONTINENCE
ANORECTUM, 6270
RECTUM
DRAINAGE, 6270
SURGERY, 6270

INDOCYANINE GREEN
BILE
CLEARANCE STUDY, 5968*

INFANT
CYSTIC FIBROSIS
HEPATITIS, 6329
JAUNDICE, OBSTRUCTIVE, 6329
DIARRHEA
PROSTAGLANDINS, 6528
DUODENUM
ENDOSCOPY, 6543
ENTERITIS
DIARRHEA, 6251*
LACTOSE INTOLERANCE, 6251*
ESOPHAGEAL REFLUX
DISEASES ASSOCIATED WITH, 6117
ESOPHAGUS
ATRESIA, 6112
ENDOSCOPY, 6543
FISTULA, 6106
GASTROENTERITIS
CARBOHYDRATES, 6336
VIRUS DISEASES, 6529
GASTROINTESTINAL DISEASES
PARENTERAL ALIMENTATION, 6535
JAUNDICE
PREGNANCY, 6367*
KWASHIORKOR
DIET, 6254
LACTOSE INTOLERANCE
IMMUNOLOGY, 6253
TOXICITY, 6253
LIVER
NEOPLASMS, MALIGNANT, 6361*
MARASMUS
DIET, 6254
MILK
HYPERSENSITIVITY, 6253
INTOLERANCE, 6253
NUTRITION DISORDERS
AMINO ACIDS, 6532
PROTEINS, 6532
PARENTERAL ALIMENTATION
COMPLICATIONS, 6535
DIET, 6535
TECHNIQUES, 6535
PROTEIN-LOSING ENTEROPATHIES
AMINO ACIDS, 6532
PROTEINS, 6532
SHIGELLOSIS
ANTIBIOTICS, 6542
STOMACH
ENDOSCOPY, 6543

INFARCTION
INTESTINES
DIAGNOSIS, 6059*
RADIONUCLIDES, 6059*
SCANNING, SCINTILLATION, 6059*

INFECTION, BACTERIA
SEE BACTERIAL INFECTIONS

INFECTION, VIRUS
SEE VIRUS DISEASES

INFLAMMATION
DUODENITIS
LYMPHOCYTES, 6228
DUODENUM
DISEASES ASSOCIATED WITH, 6197

INFLAMMATION (continued)
ILEUM
DIAGNOSIS, 6246
DRUG THERAPY, 6246
JEJUNUM, 6246
SURGERY, 6246
JEJUNUM
DIAGNOSIS, 6246
DRUG THERAPY, 6246
SURGERY, 6246
SALIVARY GLANDS
SURGERY, 6545
STOMACH
DISEASES ASSOCIATED WITH, 6197

INFLAMMATORY BOWEL DISEASES
COMPLICATIONS
UROGENITAL SYSTEM, 6297
CROHN'S DISEASE
DISEASES ASSOCIATED WITH, 6317*
DISEASES ASSOCIATED WITH, 6562*
EPIDEMIOLOGY, 6321
FAMILIAL FACTORS
IMMUNITY, 6315*
IMMUNITY
INTEGUMENTARY SYSTEM, 6315*
PATHOLOGY, 6314*
IMMUNOGLOBULINS
DEFICIENCY, 6319
MUSCULOSKELETAL SYSTEM
DISEASES ASSOCIATED WITH, 6316, 6317*
ETIOLOGY, 6317*
GENETICS, 6317*
SALIVA
IMMUNOGLOBULINS, 6319
SEQUELAE
COLON, 6312*
RADIOLOGY, 6312*
SERUM
IMMUNOGLOBULINS, 6313*
LYSOZYMES, 6313*
PROTEINS, 6313*
VIROLOGY, 6320
VIRUSES, 6320

INTEGUMENTARY SYSTEM
COLITIS, ULCERATIVE
IMMUNITY, 6315*
CROHN'S DISEASE
IMMUNITY, 6315*
GASTROINTESTINAL SYSTEM
NEOPLASMS, MALIGNANT, 6540
PRECANCEROUS CONDITIONS, 6540
INFLAMMATORY BOWEL DISEASES
IMMUNITY, 6315*

INTESTINAL ABSORPTION
OBESITY
SHUNT, INTESTINAL, 6224*
RADIONUCLIDES, 6046
SHUNT, INTESTINAL
FATS, 6224*

INTESTINAL OBSTRUCTION
CHOLECYSTITIS, 6498
DISEASES ASSOCIATED WITH
GASTROENTERITIS, 6506*

INTESTINAL OBSTRUCTION (continued)
ENTEROSTOMY
PHYSIOLOGY, 6035
SECRETION
ETIOLOGY, 6016*

INTESTINE, LARGE
SEE ALSO CECUM, COLON, RECTUM
BACTERIA
DIETARY FACTORS, 6018*
FATS, 6018*
CELLS
HIRSCHSPRUNG'S DISEASE, 6262*
HISTOCHEMISTRY
HIRSCHSPRUNG'S DISEASE, 6262*
IMMUNOLOGY
HIRSCHSPRUNG'S DISEASE, 6262*
MOTILITY
DIETARY FACTORS, 6018*
FATS, 6018*
NEOPLASM METASTASIS
AMINES, 6070
CARCINOEMBRYONIC ANTIGEN, 6070
DIAGNOSIS, 6070
ENZYMES, 6070
MARKER STUDY, 6070
NEOPLASMS
HISTOLOGY, 6221*
PATHOLOGY, 6260*
REVIEW, 6221*
SURGERY, 6260*
THERAPY, 6288
NEOPLASMS, MALIGNANT
COMPLICATIONS, 6293
DIAGNOSIS, 6070, 6287
DIETARY FACTORS, 6018*
FATS, 6018*
SURGERY
COMPLICATIONS, 6271
SEPSIS, 6271
VILLI
NEOPLASMS, 6260*

INTESTINE, SMALL
SEE ALSO DUODENUM, ILEUM, JEJUNUM
ACIDS
SECRETIN, 6026
BARIUM
TECHNIQUES, 6056*
BILE
SECRETION, 5996
BLOOD
OSMOTIC PRESSURE, 6054
CELLS
KINETICS, 6037
CHOLESTEROL
SYNTHESIS, 6007*
CIRCULATION
CHOLERA, 6041*
OSMOTIC PRESSURE, 6054
CYTOTOXICITY
ALCOHOLS, 6516
DISACCHARIDASES
CIRCADIAN RHYTHM, 6009*
NEONATE, 6009*
DRUG EFFECTS ON
ASPIRIN, 6180
EMPHYSEMA
ENDOSCOPY, 6058*

INTESTINE, SMALL (continued)
ENZYMES
CHOLERA, 6036
FISTULA
DIET, 6233
NUTRITION, 6233
SURGERY, 6234
THERAPY, 6233, 6234
GARDNER'S SYNDROME
DIAGNOSIS, 6243
ENDOSCOPY, 6243
GLYCOPROTEINS
ENZYMES, 6029
HEMORRHAGE
ENDOSCOPY, 6057*
HORMONE CONTROL
CELLS, 6037
MITOSIS, 6037
HYPERPLASIA
BILE, 5996
LIPIDS
SYNTHESIS, 6013*
MELENA
ANGIOGRAPHY, 6247
ARTERIOGRAPHY, 6247
BLEEDING, 6247
NEOPLASMS, 6247
MEMBRANES
CHEMICAL COMPOSITION, 6029
ENZYMES, 6029
GLYCOPROTEINS, 6029
MITOSIS
BILE, 6015*
NERVOUS SYSTEM, 6034
MORPHOLOGY
BARIUM, 6056*
CHOLERA, 6036
MOTILITY
HORMONE CONTROL, 6025
NERVOUS CONTROL, 6025
NEOPLASMS
ANGIOGRAPHY, 6247
ARTERIOGRAPHY, 6247
BLEEDING, 6247
HISTOLOGY, 6221*
REVIEW, 6221*
NEOPLASMS, MALIGNANT
PATHOLOGY, 6222*
PROGNOSIS, 6220*
REVIEW, 6220*, 6222*
NERVOUS CONTROL
CELLS, 6037
MITOSIS, 6037
OBESITY
SHUNT, INTESTINAL, 6224*
OBSTRUCTION
DISEASES ASSOCIATED WITH, 6242
HERNIA, 6242
OSMOTIC PRESSURE
DILATATION, 6054
PANCREAS
SECRETION, 5996
SECRETION
CHOLERA, 6017*
STOMACH
MOTILITY, 6022
SECRETION, 6022, 6178
VITAMIN D
PHOSPHATE, 6030
STEROLS, 6030

INTESTINES
ANASTOMOSIS
CLOTTING, 6049
HEALING, 6049
PROTHROMBIN, 6049
ANOMALY, CONGENITAL
SURGERY, 6272
THERAPY, 6272
BACTERIA
PANCREAS FUNCTION TESTS, 6008*
BACTERIAL INFECTIONS
DIAGNOSIS, 6308
CIRCULATION
ULTRASOUND, 6006*
DISEASE
REVIEW, 6309
FISTULA
ETIOLOGY, 6232
PROGNOSIS, 6232
REVIEW, 6232
THERAPY, 6232
HORMONES
SYNTHESIS, 6032
INFARCTION
DIAGNOSIS, 6059*
RADIONUCLIDES, 6059*
SCANNING, SCINTILLATION, 6059*
INTUSSUSCEPTION
DIAGNOSIS, 6059*
RADIONUCLIDES, 6059*
SCANNING, SCINTILLATION, 6059*
ISCHEMIA
DIAGNOSIS, 6006*
ULTRASOUND, 6006*
LYMPH
LIPOPROTEINS, 6014*
MOTILITY
APPENDICITIS, 6282
DIETARY FACTORS, 6018*
FATS, 6018*
MUCUS
CALCIUM, 6038
CYSTIC FIBROSIS, 6038
DISEASES ASSOCIATED WITH, 6038
SYNTHESIS, 6038
NEOPLASMS, MALIGNANT
IMMUNOGLOBULINS, 6295
PROTOZOAL DISEASES
EPIDEMIOLOGY, 6554
PSEUDO-OBSTRUCTION
PROSTAGLANDINS, 6244
SCANNING, SCINTILLATION
RADIONUCLIDES, 6059*
SURGERY
GROWTH FACTORS, 6226*
HEALING, 6049
NEONATE, 6226*

INTOLERANCE
GASTROENTERITIS
CARBOHYDRATES, 6536
MILK
IMMUNOLOGY, 6253
INFANT, 6253

INTRINSIC FACTOR
SECRETION
DRUG EFFECTS ON, 6204*
H2 RECEPTOR ANTAGONISTS, 6204*

INTRINSIC FACTOR (continued)
STOMACH
DRUG EFFECTS ON, 6204*
H2 RECEPTOR ANTAGONISTS, 6204*

INTUSSUSCEPTION
INTESTINES
DIAGNOSIS, 6059*
RADIONUCLIDES, 6059*
SCANNING, SCINTILLATION, 6059*

IRON
HEMOCHROMATOSIS
CLEARANCE STUDY, 6373
LIVER, 6373
METABOLISM, 6399

IRRITABLE COLON
DIAGNOSIS, 6299
FOOD
ELECTROPHYSIOLOGY, 6263*
MOTILITY, 6263*
PARASYMPATHOLYTICS
ELECTROPHYSIOLOGY, 6263*
MOTILITY, 6263*
THERAPY, 6299

ISCHEMIA
INTESTINES
DIAGNOSIS, 6006*
ULTRASOUND, 6006*
LIVER
ADENOSINE TRIPHOSPHATE, 5971*
MAGNESIUM, 5971*

JAUNDICE
COMMON BILE DUCT
NEOPLASMS, BENIGN, 6496
LIPOPROTEINS
DIAGNOSIS, 6063*
PREGNANCY
CHOLESTASIS, 6367*
FATTY LIVER, 6367*
HEPATITIS, INFECTIOUS, 6367*
HORMONES, 6367*
INFANT, 6367*
PREMATURITY, 6367*

JAUNDICE, CHRONIC IDIOPATHIC
ENZYMES
DEFICIENCY, 6415*
LIVER
PATHOLOGY, 6415*

JAUNDICE, OBSTRUCTIVE
BIOPSY, 6471*
CHOLANGIOGRAPHY, 6471*
TECHNIQUES, 6488
CYSTIC FIBROSIS
DISEASES ASSOCIATED WITH, 6329
INFANT, 6329
DIAGNOSIS, 6471*
SCANNING, SCINTILLATION, 6474*
DRAINAGE
TECHNIQUES, 6473*
THERAPY, 6473*
ENDOSCOPY, 6471*

JAUNDICE, OBSTRUCTIVE (continued)
GALLBLADDER
DIAGNOSIS, 6485
ULTRASONOGRAPHY, 6485
LIPOPROTEINS, 6477*
ENZYMES, 6381
TRIGLYCERIDES, 6381
LYSOSOMES
BILE, 6478*
BIOCHEMISTRY, 6478*
ULTRASTRUCTURE, 6478*

JEJUNUM
SEE ALSO INTESTINE, SMALL
ABSORPTION
MOTILITY, 6023
DIGESTION
MOTILITY, 6023
DRUG EFFECTS ON
ASPIRIN, 6180
FATTY ACIDS
METABOLISM, 6219*
TRACER STUDY, 6219*
ILEUM
INFLAMMATION, 6246
INFLAMMATION
DIAGNOSIS, 6246
DRUG THERAPY, 6246
SURGERY, 6246
NEOPLASMS, MALIGNANT
DIAGNOSIS, 6231
POLYPS
SURGERY, 6121
SHUNT, INTESTINAL
BIOCHEMISTRY, 6240
MORPHOLOGY, 6240
OBESITY, 6240
STOMACH
MOTILITY, 6022
SECRETION, 6022

KIDNEYS
LIPIDS
LIVER DISEASES, 6354*
UREMIA, 6354*
MORPHOLOGY
LIVER DISEASES, 6354*
UREMIA, 6354*

KWASHIORKOR
DIET
BIOCHEMISTRY, 6254
INFANT, 6254
DRUGS
BINDING, 6522
PROTEINS, 6522
LIVER
HISTOLOGY, 6537
MORPHOLOGY, 6511
PATHOLOGY, 6537
PROGNOSIS, 6537
MALABSORPTION SYNDROMES
DIET, 6254

LACTASE DEFICIENCY
SEE LACTOSE INTOLERANCE

LACTOSE INTOLERANCE
ENTERITIS
INFANT, 6251*
IMMUNOLOGY
INFANT, 6253
MALABSORPTION SYNDROMES
ETHNIC FACTORS, 6255
GEOGRAPHICAL FACTORS, 6255
TOXICITY
INFANT, 6253

LAMBLIASIS
SEE GIARDIASIS

LAPAROSCOPY
ABDOMEN
NEOPLASM METASTASIS, 6087
CHOLANGIOGRAPHY, 6408
LIVER
NEOPLASMS, 6392
NEOPLASMS, MALIGNANT, 6392

LAPAROTOMY
DUODENUM
HERNIA, 6245

LARGE INTESTINE
SEE INTESTINE, LARGE

LASER
BLEEDING
THERAPY, 6045*
DUODENUM
BLEEDING, 6045*
GASTROINTESTINAL SYSTEM
BLEEDING, 6045*
STOMACH
BLEEDING, 6045*

LIPIDS
SEE ALSO TRIGLYCERIDES
BILE
AGE FACTORS, 5959*
CONTRAST MEDIA, 6469*
OBESITY, 5959*
CHOLELITHIASIS
BILE, 6491
DUODENUM, 6012*
HYPERLIPOPROTEINEMIA
BILE, 6365*
SERUM, 6365*
INTESTINE, SMALL
SYNTHESIS, 6013*
KIDNEYS
LIVER DISEASES, 6354*
UREMIA, 6354*
LIVER
VITAMIN A, 5970*
LIVER DISEASES
ERYTHROCYTES, 6377
METABOLISM
VITAMIN A, 5970*
SERUM
CHENODEOXYCHOLIC ACID, 5963*

LIPODYSTROPHY, INTESTINAL
LYMPHOCYTES, 6228

LIPOPROTEINS
CHOLESTASIS
DIAGNOSIS, 6063*
INTESTINES
LYMPH, 6014*
JAUNDICE
DIAGNOSIS, 6063*
JAUNDICE, OBSTRUCTIVE, 6477*
ENZYMES, 6381
TRIGLYCERIDES, 6381
LIVER CIRRHOSIS, OBSTRUCTIVE, 6460*
LIVER DISEASES
DIAGNOSIS, 6063*
PLASMA, 6354*
MESENTERY
LYMPH, 6014*
UREMIA
PLASMA, 6354*

LIVER
ABSCESS
DIAGNOSIS, 6391
SCANNING, SCINTILLATION, 6391
THERAPY, 6391
ADENOSINE TRIPHOSPHATASE
BACTERIA, 5978
ENDOTOXINS, 5978
ALCOHOLS
OXIDATION, 5955*
ANESTHETICS
BINDING, 5966*
ARTERIES
SCHISTOSOMIASIS, 6553
BACTERIAL INFECTIONS, 6417*
BIOPSY
ASCITES, 6355*
BLEEDING, 6355*
LYMPHOMA, 6362*
NEOPLASMS, MALIGNANT, 6362*
TECHNIQUES, 6355*, 6407
CELLS
ELECTROPHYSIOLOGY, 5983
TRANSPORT, 5979
CHLORIDES
TECHNIQUES, 5972*
CHOLANGIOJEJUNOSTOMY
TECHNIQUES, 6356*
CLEARANCE STUDY
GALACTOSE, 5965*
CYSTS
ANDROGENS, 6368*
DRUG-INDUCED, 6368*
ECHINOCOCCOSIS, 6548*
SURGERY, 6372, 6548*
THERAPY, 6548*
DENSIOMETRY, 6409
DRUG EFFECTS ON
REVIEW, 6401
ULTRASTRUCTURE, 5985
DRUG METABOLISM
ALCOHOLISM, 6447*
BILE ACIDS AND SALTS, 5977
BREATH TEST, 6541
DRUG THERAPY
REVIEW, 6401
DRUG TOXICITY
BINDING, 6424
METABOLISM, 6424

LIVER (continued)
DRUGS
TRANSPORT, 5977
ENDOTOXINS
STEROIDS, 5994
ESTROGENS
BINDING, 6004
FATTY ACIDS
PROTEINS, 5975
GALACTOSE
EXCRETION, 5976
GASES
GASTROINTESTINAL DISEASES, 6364*
HEMOCHROMATOSIS
IRON, 6373
HYPERPLASIA
ANDROGENS, 6368*
DRUG-INDUCED, 6368*
HYPOXIA
FATTY ACIDS, 5999
IMMUNOLOGY, 6358*
ISCHEMIA
ADENOSINE TRIPHOSPHATE, 5971*
MAGNESIUM, 5971*
JAUNDICE, CHRONIC IDIOPATHIC
PATHOLOGY, 6415*
KWASHIORKOR
HISTOLOGY, 6537
MORPHOLOGY, 6511
PATHOLOGY, 6537
PROGNOSIS, 6537
LIPIDS
VITAMIN A, 5970*
MEMBRANES
ADENOSINE TRIPHOSPHATASE, 5978
METABOLISM
ENDOTOXINS, 5994
MORPHOLOGY
ANDROGENS, 6368*
DRUG EFFECTS ON, 6368*
LYMPHOMA, 6362*
NEOPLASMS, MALIGNANT, 6362*
NECROSIS
ALPHA FETOPROTEIN, 6351*
ANESTHETICS, 5967*
DRUG-INDUCED, 5967*
NEOPLASMS
ANDROGENS, 6368*
CARCINOGENS, 6389
CLASSIFICATION, 6386
DIAGNOSIS, 6392
DISEASES ASSOCIATED WITH, 6389
DRUG-INDUCED, 6368*
HEPATOCYTES, 6385
LAPAROSCOPY, 6392
LIVER FUNCTION TESTS, 6389
MARKER STUDY, 6385
REVIEW, 6386, 6389, 6395
SURGERY, 6390
THERAPY, 6389
NEOPLASMS, BENIGN
CONTRACEPTIVES, ORAL, 6366*
NEOPLASMS, MALIGNANT
ALPHA FETOPROTEIN, 6062*, 6360*
CHILD, 6361*
DIAGNOSIS, 6062*, 6079, 6360*, 6361*, 6392
DRUG THERAPY, 6361*
INFANT, 6361*

LIVER (continued)
NEOPLASMS, MALIGNANT (continued)
LAPAROSCOPY, 6392
NEOPLASMS, BENIGN, 6360*
SEX FACTORS, 6361*
STEROIDS, 6360*
SURGERY, 6361*
SURVIVAL, 6361*
NUCLEIC ACIDS
ANESTHETICS, 5966*
ORGAN CULTURE
ADENOSINE TRIPHOSPHATE, 5971*
MAGNESIUM, 5971*
PERFUSION
GALACTOSE, 5976
PROLACTIN
ANDROGENS, 6005
BINDING, 6005
PROTEINS
SYNTHESIS, 5957*
RADIONUCLIDES
ANALYSIS, 6076
COMPLICATIONS, 6076
SCANNING, SCINTILLATION, 6071
TECHNIQUES, 6071, 6075
TRACER STUDY, 6075
REGENERATION
ALPHA FETOPROTEIN, 6351*
SCANNING, SCINTILLATION
TECHNIQUES, 6071
SCHISTOSOMIASIS
HYPERTENSION, PORTAL, 6553
SURGERY
TECHNIQUES, 6356*
TOXICITY
PESTICIDES, 5960*
TRANSPORT
BILE ACIDS AND SALTS, 5979
GASTRIN, 5956*
WATER, 5979
URINARY SYSTEM
DISEASE, 6541
VEINS
GASES, 6364*

LIVER CIRRHOSIS
AUSTRALIA ANTIGEN
FAMILIAL FACTORS, 6461*
BLOOD
AMINES, 6413
COMPLICATIONS
ANEMIA, HEMOLYTIC, 6444*
BACTERIAL INFECTIONS, 6444*
BONES, 6452*
DIAGNOSIS, 6462*
HYPOXIA, 6459*
NERVOUS SYSTEM, 6462*
SEPSIS, 6444*
COPPER
CERULOPLASMIN, 6465*
KINETICS, 6465*
DISEASES ASSOCIATED WITH, 6369*
DRUG THERAPY, 6412
HYPOXIA
ETIOLOGY, 6459*
IMMUNOLOGY, 6358*
LIVER DISEASES, ALCOHOLIC
VARICES, 6458
LYMPHOCYTES, 6446

LIVER CIRRHOSIS (continued)
PROTEIN-LOSING ENTEROPATHIES
OXIDOREDUCTASES, 6544
SERUM
ALBUMINS, 6406
IMMUNOGLOBULINS, 6406
PROTEINS, 6406
THERAPY
VITAMIN A, 6451*
TRANSPORT
VITAMIN A, 6451*
URINARY SYSTEM
COMPLICATIONS, 6463*
LYSOZYMES, 6463*
URINE
AMINES, 6413
VITAMIN A
METABOLISM, 6451*
VITAMIN D
METABOLISM, 6452*

LIVER CIRRHOSIS, OBSTRUCTIVE
COMPLICATIONS
SCLERODERMA, 6464*
LIPOPROTEINS, 6460*
LYMPHOCYTES, 6359*

LIVER COMA
ENDOTOXINS
DRUG-INDUCED, 5987
AMMONIA
HEPATECTOMY, 5981
PATHOLOGY, 6393
COMPLICATIONS
EDEMA, 6363*
RESPIRATORY SYSTEM, 6363*
REVIEW, 6374
DRUG THERAPY, 6466*
ETIOLOGY
REVIEW, 6374
HEMODIALYSIS
MEMBRANES, 6382
PERMEABILITY, 6382
HEPATECTOMY
BACTERIA, 5981
HEPATITIS, INFECTIOUS
ETIOLOGY, 6374
HYPERTENSION, PORTAL
REVIEW, 6467
HYPOTENSION
HORMONES, 6380
LIVER FUNCTION TESTS
REVIEW, 6374
PATHOLOGY
REVIEW, 6374
PROGNOSIS
REVIEW, 6374
RENIN
HORMONES, 6380
REVIEW, 6396
SODIUM
HORMONES, 6380
THERAPY, 6466*
REVIEW, 6374
URINARY SYSTEM
CIRCULATION, 5992
COMPLICATIONS, 6463*
LYSOZYMES, 6463*

LIVER DISEASES
AUSTRALIA ANTIGEN
DRUG THERAPY, 6379
IMMUNOSUPPRESSION, 6379
BILE ACIDS AND SALTS
METABOLISM, 6475*
TECHNIQUES, 6403
BIOCHEMISTRY, 6353*
BLOOD
AMINES, 6413
CHOLANGIOGRAPHY
TECHNIQUES, 6488
COMPLICATIONS
DIAGNOSIS, 6462*
EDEMA, 6363*
NERVOUS SYSTEM, 6462*
RESPIRATORY SYSTEM, 6363*
SURGERY, 6400
CONNECTIVE TISSUE
ANTIBODIES, 6499*
DIAGNOSIS
BIOCHEMISTRY, 6402
ENZYMES, 6402
DRUG THERAPY, 6376, 6412, 6414
ERYTHROCYTES
LIPIDS, 6377
HISTOLOGY, 6353*
IMMUNOGLOBULINS
LYMPHOCYTES, 6383
SYNTHESIS, 6383
IMMUNOLOGY, 6353*, 6358*
KIDNEYS
LIPIDS, 6354*
MORPHOLOGY, 6354*
LIPOPROTEINS
DIAGNOSIS, 6063*
LIVER FUNCTION TESTS
TECHNIQUES, 6352*
LYMPHOCYTES, 6359*, 6446
MORPHOLOGY, 6353*
PLASMA
LIPOPROTEINS, 6354*
RADIONUCLIDES
KINETICS, 6465*
REVIEW, 6397, 6398, 6401
SCHISTOSOMIASIS
CHLORIDES, 5972*
SECRETION
BILE ACIDS AND SALTS, 6475*
SERUM
ADENOSINE CYCLIC 3',5'
MONOPHOSPHATE, 6410
ALBUMINS, 6406
BILE ACIDS AND SALTS, 6403, 6475*
IMMUNOGLOBULINS, 6406
PROTEINS, 6406
SIMULATION
LIVER FUNCTION TESTS, 6352*
SODIUM
TRANSPORT, 6377
UREA
ENZYMES, 6448*
METABOLISM, 6448*
URINE
AMINES, 6413

LIVER DISEASES, ALCOHOLIC
BUDD-CHIARI SYNDROME
SHUNT, 6357*

LIVER DISEASES, ALCOHOLIC (continued)
COMPLICATIONS
BONES, 6452*
DIAGNOSIS, 6449*
FATTY LIVER
PATHOLOGY, 6450*
HEPATITIS
HYALIN SUBSTANCE, 6457
HYPERSENSITIVITY, 6455*
IMMUNOLOGY, 6455*
PATHOLOGY, 6454*
LIVER CIRRHOSIS
VARICES, 6458
LYMPHOCYTES, 6446
PATHOLOGY, 6449*
UREA
ENZYMES, 6448*
METABOLISM, 6448*
VARICES
THERAPY, 6458
VITAMIN D
METABOLISM, 6452*

LIVER FUNCTION TESTS
LIVER
NEOPLASMS, 6389
LIVER COMA
REVIEW, 6374
LIVER DISEASES
SIMULATION, 6352*
TECHNIQUES, 6352*
PLASMA
AMINO ACIDS, 6405
REVIEW, 6402

LIVER INJURY
ALCOHOLS
DIAGNOSIS, 6449*
ETIOLOGY, 6449*
PATHOLOGY, 6449*
ANESTHETICS
CHEMICAL PROPERTIES, 5967*
BLEEDING
SURVIVAL, 6371*
CIRCULATION, 6003
DRUG-INDUCED, 6420*, 6422
ANESTHETICS, 5967*
PREVENTION, 6000
DRUG THERAPY
NECROSIS, 6418*
DRUG TOXICITY
HEPATITIS, 5974
ENDOTOXINS, 5964*
ETIOLOGY
REVIEW, 6375
HEMORRHAGE
ETIOLOGY, 6421*
PREVENTION, 6421*
PROTHROMBIN, 6421*
REVIEW, 6421*
THERAPY, 6421*
HEMOSTASIS
REVIEW, 6375
HEPATITIS, TOXIC
DRUG-INDUCED, 6423
MORPHOLOGY, 6371*
NECROSIS
DRUG-INDUCED, 6418*
PARENTERAL ALIMENTATION, 6411

LIVER INJURY (continued)
PESTICIDES, 5960*
PREVENTION
TRYPSIN, 6000
REVIEW, 6371*
SURGERY
REVIEW, 6375
SURVIVAL
REVIEW, 6375
THERAPY
REVIEW, 6375
TRANSFUSION
METABOLISM, 5993
SURVIVAL, 5993

LUNG
SEE RESPIRATORY SYSTEM

LYMPH
INTESTINES
LIPOPROTEINS, 6014*
MESENTERY
LIPOPROTEINS, 6014*

LYMPHOCYTES
CELIAC DISEASE, 6228
CROHN'S DISEASE, 6228
DUODENITIS
INFLAMMATION, 6228
HEPATITIS, CHRONIC, 6446
LIPODYSTROPHY, INTESTINAL, 6228
LIVER CIRRHOSIS, 6446
LIVER CIRRHOSIS, OBSTRUCTIVE, 6359*
LIVER DISEASES, 6359*, 6446
IMMUNOGLOBULINS, 6383
LIVER DISEASES, ALCOHOLIC, 6446

LYMPHOMA
GASTROINTESTINAL SYSTEM
DIAGNOSIS, 6507*
DRUG THERAPY, 6507*
SURGERY, 6507*
LIVER
BIOPSY, 6362*
MORPHOLOGY, 6362*

LYSOSOMES
CHOLESTASIS
BILE, 6478*
JAUNDICE, OBSTRUCTIVE
BILE, 6478*
BIOCHEMISTRY, 6478*
ULTRASTRUCTURE, 6478*

LYSOZYMES
INFLAMMATORY BOWEL DISEASES
SERUM, 6313*
LIVER CIRRHOSIS
URINARY SYSTEM, 6463*
LIVER COMA
URINARY SYSTEM, 6463*

MAGNESIUM
LIVER
ISCHEMIA, 5971*
ORGAN CULTURE, 5971*

MALABSORPTION SYNDROMES
CHILD
AMINO ACIDS, 6531
CONNECTIVE TISSUE
ANTIBODIES, 6499*
CHILD, 6499*
DIARRHEA
CHILD, 6531
DIET
THERAPY, 6531
DRUG-INDUCED, 6256
KWASHIORKOR
DIET, 6254
LACTOSE INTOLERANCE
ETHNIC FACTORS, 6255
GEOGRAPHICAL FACTORS, 6255
MARASMUS
DIET, 6254
PROTEIN-LOSING ENTEROPATHIES
CHILD, 6531

MALIGNANT
SEE NEOPLASMS, MALIGNANT

MALLORY-WEISS SYNDROME
DIAGNOSIS, 6119
ETIOLOGY, 6119
THERAPY, 6119

MALNUTRITION
SEE NUTRITION DISORDERS

MANOMETRY
PSEUDOCYSTS
PRESSURE STUDY, 6349
RUPTURE, 6349
STOMACH
NEOPLASMS, MALIGNANT, 6186

MARASMUS
DIET
BIOCHEMISTRY, 6254
INFANT, 6254
MALABSORPTION SYNDROMES
DIET, 6254

MECKEL'S DIVERTICULUM
PERITONEUM
RADIOLOGY, 6539
RADIONUCLIDES
MARKER STUDY, 6156

MEGAESOPHAGUS
SEE ACHALASIA

MELENA
INTESTINE, SMALL
ANGIOGRAPHY, 6247
ARTERIOGRAPHY, 6247
BLEEDING, 6247
NEOPLASMS, 6247

MENETRIER'S DISEASE
COMPLICATIONS, 6139*
FOLIC ACID
DEFICIENCY, 6139*
PARASYMPATHOLYTICS
PROTEINS, 6138*

MESENTERY
CIRCULATION
DRUG EFFECTS ON, 6040*
VASOPRESSIN, 6040*
LYMPH
LIPOPROTEINS, 6014*

METASTASIS
SEE NEOPLASM METASTASIS

MILK
DIARRHEA
PROTEINS, 6251*
HYPERSENSITIVITY
IMMUNOLOGY, 6253
INFANT, 6253
INTOLERANCE
IMMUNOLOGY, 6253
INFANT, 6253
ULCER, PEPTIC
THERAPY, 6217

MITOSIS
ILEUM
BILE, 6015*
INTESTINE, SMALL
BILE, 6015*
HORMONE CONTROL, 6037
NERVOUS CONTROL, 6037
NERVOUS SYSTEM, 6034

MOTILITY
ANTRUM
ANOMALY, 6194
COLON
DIETARY FACTORS, 6018*
FATS, 6018*
CONSTIPATION
CHILD, 6538
INTESTINE, LARGE
DIETARY FACTORS, 6018*
FATS, 6018*
INTESTINE, SMALL
HORMONE CONTROL, 6025
NERVOUS CONTROL, 6025
INTESTINES
APPENDICITIS, 6282
DIETARY FACTORS, 6018*
FATS, 6018*
IRRITABLE COLON
FOOD, 6263*
PARASYMPATHOLYTICS, 6263*
JEJUNUM
ABSORPTION, 6023
DIGESTION, 6023
STOMACH
ANOMALY, 6194
ILEUM, 6022
INTESTINE, SMALL, 6022
JEJUNUM, 6022

MUCUS
GASTROINTESTINAL DISEASES
CHEMICAL COMPOSITION, 6523
GLYCOPROTEINS, 6523
SECRETION, 6524, 6525
SYNTHESIS, 6524

MUCUS (continued)
INTESTINES
CALCIUM, 6038
CYSTIC FIBROSIS, 6038
DISEASES ASSOCIATED WITH, 6038
SYNTHESIS, 6038
SECRETION
THERAPY, 6525

MUSCULOSKELETAL SYSTEM
COLITIS, ULCERATIVE
DISEASES ASSOCIATED WITH, 6316, 6317*
ETIOLOGY, 6317*
GENETICS, 6317*
CROHN'S DISEASE
DISEASES ASSOCIATED WITH, 6316
ETIOLOGY, 6317*
GENETICS, 6317*
INFLAMMATORY BOWEL DISEASES
DISEASES ASSOCIATED WITH, 6316, 6317*
ETIOLOGY, 6317*
GENETICS, 6317*

NECROSIS
DRUG THERAPY
LIVER INJURY, 6418*
LIVER
ALPHA FETOPROTEIN, 6351*
ANESTHETICS, 5967*
DRUG-INDUCED, 5967*
LIVER INJURY
DRUG-INDUCED, 6418*
PANCREATITIS
COLON, 6340*

NEONATE
DISACCHARIDASES
CIRCADIAN RHYTHM, 6009*
ENTEROCOLITIS, NECROTIZING
THERAPY, 6519
GASTROINTESTINAL DISEASES
VIRUSES, 6047
HEPATITIS
IMMUNITY, 6430*
PREVENTION, 6430*
HEPATITIS, SERUM
IMMUNITY, 6430*
PREVENTION, 6430*
INTESTINE, SMALL
DISACCHARIDASES, 6009*
INTESTINES
SURGERY, 6226*

NEOPLASM METASTASIS
ABDOMEN
LAPAROSCOPY, 6087
GASTROINTESTINAL SYSTEM
SEX FACTORS, 6500*
INTESTINE, LARGE
AMINES, 6070
CARCINOEMBRYONIC ANTIGEN, 6070
DIAGNOSIS, 6070
ENZYMES, 6070
MARKER STUDY, 6070
STOMACH
RECURRENCE, 6164
SURGERY, 6164

NEOPLASMS
APPENDIX, 6284
BILE DUCTS
SURGERY, 6390
BILIARY TRACT
CHOLANGIOGRAPHY, 6328
ENDOSCOPY, 6328
CARCINOEMBRYONIC ANTIGEN
ALCOHOLS, 6077
DIAGNOSIS, 6077
SMOKING, 6077
COLON
DIAGNOSIS, 6074
PATHOLOGY, 6260*
RADIOLOGY, 6261*
RADIOTHERAPY, 6258*
RECURRENCE, 6257*
REVIEW, 6258*, 6261*
SIGMOIDOSCOPY, 6074
SURGERY, 6258*, 6260*
THERAPY, 6257*, 6258*
VILLI, 6260*
ENDOCRINE SYSTEM
GASTRIN, 6510
GALLBLADDER, 6484
GASTROINTESTINAL SYSTEM
CALCIFICATION, 6508*
DRUG THERAPY, 6513
INTESTINE, LARGE
HISTOLOGY, 6221*
PATHOLOGY, 6260*
REVIEW, 6221*
SURGERY, 6260*
THERAPY, 6288
VILLI, 6260*
INTESTINE, SMALL
ANGIOGRAPHY, 6247
ARTERIOGRAPHY, 6247
BLEEDING, 6247
HISTOLOGY, 6221*
MELENA, 6247
REVIEW, 6221*
LIVER
ANDROGENS, 6368*
CARCINOGENS, 6389
CLASSIFICATION, 6386
DIAGNOSIS, 6392
DISEASES ASSOCIATED WITH, 6389
DRUG-INDUCED, 6368*
HEPATOCYTES, 6385
LAPAROSCOPY, 6392
LIVER FUNCTION TESTS, 6389
MARKER STUDY, 6385
REVIEW, 6386, 6389, 6395
SURGERY, 6390
THERAPY, 6389
PANCREAS
BILIARY TRACT, 6332
ENDOSCOPY, 6328
OBSTRUCTION, 6332
PANCREATOGRAPHY, 6328
PANCREATOGRAPHY
DIAGNOSIS, 6324*
RECTUM
BIOPSY, 6285
DIAGNOSIS, 6074
PATHOLOGY, 6260*
RADIOTHERAPY, 6258*
RECURRENCE, 6257*, 6285

NEOPLASMS (continued)
RECTUM (continued)
REVIEW, 6258*
SIGMOIDOSCOPY, 6074
SURGERY, 6258*, 6260*
THERAPY, 6257*, 6258*
VILLI, 6260*
REVIEW, 6397
SIGMOID
DIAGNOSIS, 6074
SIGMOIDOSCOPY, 6074
STOMACH
AGE FACTORS, 6162
CYTOLOGY, 6172
DIAGNOSIS, 6172, 6174
GASTRECTOMY, 6146, 6147
HISTOLOGY, 6221*
PROGNOSIS, 6146
RECURRENCE, 6164
REVIEW, 6221*
SURGERY, 6145, 6161, 6162, 6163, 6164, 6171
SURVIVAL, 6145, 6171
TECHNIQUES, 6163
VATER'S AMPULLA
DUODENOGRAPHY, 6237

NEOPLASMS, BENIGN
COMMON BILE DUCT
JAUNDICE, 6496
LIVER
CONTRACEPTIVES, ORAL, 6366*
NEOPLASMS, MALIGNANT, 6360*
STOMACH
DIAGNOSIS, 6170
SURGERY, 6170

NEOPLASMS, MALIGNANT
ANUS
THERAPY, 6291
APPENDIX, 6283
CARCINOEMBRYONIC ANTIGEN
ALCOHOLS, 6077
DIAGNOSIS, 6077, 6088
SMOKING, 6077
COLITIS, ULCERATIVE
RADIOLOGY, 6318*
COLON
BARIUM, 6318*
SURGERY, 6289
THERAPY, 6289, 6291
DIAGNOSIS
REVIEW, 6079
ESOPHAGUS, 6098
DIAGNOSIS, 6129, 6183
GALLBLADDER
CALCIFICATION, 6479*
GASTROINTESTINAL SYSTEM
CARCINOEMBRYONIC ANTIGEN, 6088
INTEGUMENTARY SYSTEM, 6540
INTESTINE, LARGE
COMPLICATIONS, 6293
DIAGNOSIS, 6070, 6287
DIETARY FACTORS, 6018*
FATS, 6018*
INTESTINE, SMALL
PATHOLOGY, 6222*
PROGNOSIS, 6220*
REVIEW, 6220*, 6222*

NEOPLASMS, MALIGNANT (continued)
INTESTINES
IMMUNOGLOBULINS, 6295
JEJUNUM
DIAGNOSIS, 6231
LIVER
ALPHA FETOPROTEIN, 6062*, 6360*
BIOPSY, 6362*
CHILD, 6361*
DIAGNOSIS, 6062*, 6079, 6360*, 6361*, 6392
DRUG THERAPY, 6361*
INFANT, 6361*
LAPAROSCOPY, 6392
MORPHOLOGY, 6362*
NEOPLASMS, BENIGN, 6360*
SEX FACTORS, 6361*
STEROIDS, 6360*
SURGERY, 6361*
SURVIVAL, 6361*
RECTUM
COMPLICATIONS, 6290
CYTOLOGY, 6286
DIAGNOSIS, 6286
PREGNANCY, 6294
SURGERY, 6289, 6290
THERAPY, 6289, 6291
SIGMOID
THERAPY, 6291
STOMACH
ACHALASIA, 6186
BIOPSY, 6182
COMPLICATIONS, 6160
CYTOLOGY, 6135*, 6182
DIAGNOSIS, 6135*, 6148, 6149, 6158, 6159, 6165, 6182, 6183
DIETARY FACTORS, 6184
ENDOSCOPY, 6135*, 6165, 6182
MANOMETRY, 6186
PROGNOSIS, 6149
REVIEW, 6135*
SURGERY, 6159, 6160
SURVIVAL, 6160
THERAPY, 6148, 6149
ULTRASTRUCTURE, 6185
VILLI, 6159

NERVOUS CONTROL
INTESTINE, SMALL
CELLS, 6037
MITOSIS, 6037
MOTILITY, 6025

NERVOUS SYSTEM
INTESTINE, SMALL
MITOSIS, 6034
LIVER CIRRHOSIS
COMPLICATIONS, 6462*
LIVER DISEASES
COMPLICATIONS, 6462*

NUCLEIC ACIDS
ANESTHETICS
BINDING, 5966*
LIVER
ANESTHETICS, 5966*

NUTRITION
INTESTINE, SMALL
FISTULA, 6233
PANCREATIC DISEASES
ENZYMES, 6350

NUTRITION DISORDERS
CHILD
AMINO ACIDS, 6532
ENZYMES, 6526
PROTEINS, 6532
INFANT
AMINO ACIDS, 6532
PROTEINS, 6532
OXIDOREDUCTASES
ENZYMES, 6544
PATHOLOGY, 6544
SALIVA
AMINO ACIDS, 6532
PROTEINS, 6532

OBESITY
BILE
CHOLESTEROL, 5959*
LIPIDS, 5959*
BILE ACIDS AND SALTS
METABOLISM, 5959*
CHOLELITHIASIS, 5959*
JEJUNUM
SHUNT, INTESTINAL, 6240
SHUNT, INTESTINAL
BIOCHEMISTRY, 6240
BODY COMPOSITION, 6224*
FATS, 6224*
INTESTINAL ABSORPTION, 6224*
INTESTINE, SMALL, 6224*
MORPHOLOGY, 6240
REVIEW, 6230
VILLI
HYPERTROPHY, 6224*

OBSTRUCTION
BILE DUCTS
BIOPSY, 6471*
CHOLANGIOGRAPHY, 6471*
DIAGNOSIS, 6471*
ENDOSCOPY, 6471*
BILIARY TRACT
BACTERIAL INFECTIONS, 6417*
BIOPSY, 6489
CHOLANGIOGRAPHY, 6489
DIAGNOSIS, 6489
ULTRASONOGRAPHY, 6489
CHOLELITHIASIS
ULTRASOUND, 6065*
CYSTIC FIBROSIS
BILIARY TRACT, 6332
DUODENUM
HERNIA, 6245
ESOPHAGUS
ENDOSCOPY, 6131
STOMACH, 6131
GALLBLADDER
RADIOLOGY, 6493
INTESTINE, SMALL
DISEASES ASSOCIATED WITH, 6242
HERNIA, 6242
PANCREAS
NEOPLASMS, 6332

OBSTRUCTIVE JAUNDICE
SEE JAUNDICE, OBSTRUCTIVE

ODDI'S SPHINCTER
BILE DUCTS
STENOSIS, 6483*
CHOLANGIOGRAPHY
REVIEW, 6068
TECHNIQUES, 6068
COMMON BILE DUCT
ENDOSCOPY, 6069
ENDOSCOPY
REVIEW, 6069
TECHNIQUES, 6069
REFLUX
DUODENUM, 6236
STENOSIS
DIAGNOSIS, 6483*
SURGERY, 6483*

ORAL CONTRACEPTIVES
SEE CONTRACEPTIVES, ORAL

ORGAN CULTURE
LIVER
ADENOSINE TRIPHOSPHATE, 5971*
MAGNESIUM, 5971*

OSMOTIC PRESSURE
INTESTINE, SMALL
BLOOD, 6054
CIRCULATION, 6054
DILATATION, 6054
PANCREAS
DILATATION, 6055

OXIDATION
HEPATOCYTES
ALCOHOLS, 5955*
LIVER
ALCOHOLS, 5955*

OXIDOREDUCTASES
NUTRITION DISORDERS
ENZYMES, 6544
PATHOLOGY, 6544
PROTEIN-LOSING ENTEROPATHIES
ENZYMES, 6544
LIVER CIRRHOSIS, 6544
PATHOLOGY, 6544

PAIN
CHOLECYSTITIS
ABDOMEN, 6498

PANCREAS
ABSCESS
CHOLANGIOGRAPHY, 6330
DIAGNOSIS, 6333*
DIET, 6333*
DRAINAGE, 6333*
ENDOSCOPY, 6330
PANCREATOGRAPHY, 6330
RADIOLOGY, 6333*
SURGERY, 6333*
ULTRASOUND, 6333*
ANOMALY
ANGIOGRAPHY, 6327

PANCREAS (continued)
CIRCULATION
ANOMALY, 6327
DILATATION
OSMOTIC PRESSURE, 6055
HORMONES
HEPATOCYTES, 5988
NEOPLASMS
BILIARY TRACT, 6332
ENDOSCOPY, 6328
OBSTRUCTION, 6332
PANCREATOGRAPHY, 6328
PSEUDOCYSTS
ASCITES, 6331
SECRETION
INTESTINE, SMALL, 5996
SECRETIN, 6026

PANCREAS FUNCTION TESTS
CYSTIC FIBROSIS
URINE, 6061*
INTESTINES
BACTERIA, 6008*
PANCREATOGRAPHY
DIAGNOSIS, 6324*
SECRETIN
DIAGNOSIS, 6324*
PANCREATITIS, CHRONIC, 6324*

PANCREATIC DISEASES
CHOLANGIOGRAPHY
PANCREATOGRAPHY, 6092
DUODENUM
DIVERTICULUM, 6238
ENDOSCOPY, 6092
NUTRITION
ENZYMES, 6350
PANCREATOGRAPHY
DIAGNOSIS, 6324*
SERUM
ADENOSINE CYCLIC 3',5'
MONOPHOSPHATE, 6410
THERAPY
ENZYMES, 6350

PANCREATIC DUCT
BILIARY TRACT
ANOMALY, 6325*
DILATATION, 6325*
COMMON BILE DUCT
ENDOSCOPY, 6472*
PANCREATOGRAPHY
ANALYSIS, 6472*
COMPLICATIONS, 6472*

PANCREATITIS
ALCOHOLISM
DIAGNOSIS, 6346
BIOCHEMISTRY
STRESS, 6337*
CHILD
PROGNOSIS, 6336*
REVIEW, 6336*
COLON
DISEASES ASSOCIATED WITH, 6339*
NECROSIS, 6340*
COMPLICATIONS
RESPIRATORY SYSTEM, 6346

PANCREATITIS (continued)
DIAGNOSIS
TRIGLYCERIDES, 6346
DISEASES ASSOCIATED WITH
SCHONLEIN-HENOCH PURPURA, 6341*
ENDOCRINE SYSTEM
HOMEOSTASIS, 6337*
STRESS, 6337*
GLUCAGON
DRUG THERAPY, 6334*
LAVAGE
SURVIVAL, 6335*
PARASYMPATHOLYTICS
DRUG THERAPY, 6334*
GLUCAGON, 6334*
PROGNOSIS
HYPERTENSION, 6348
SCHONLEIN-HENOCH PURPURA
ETIOLOGY, 6341*
SERUM
TRIGLYCERIDES, 6346
SURGERY
DIAGNOSIS, 6345
PREVENTION, 6345
THERAPY, 6345
THERAPY
LAVAGE, 6335*

PANCREATITIS, CHRONIC
COMPLICATIONS
DUODENUM, 6347
DUODENUM
ANOMALY, 6347
CYSTS, 6239
PANCREAS FUNCTION TESTS
SECRETIN, 6324*
SURGERY, 6342, 6343
PROGNOSIS, 6344
SURVIVAL, 6344

PANCREATOGRAPHY
AMYLASES
REVIEW, 6067*
BILIARY TRACT DISEASES
CHOLANGIOGRAPHY, 6092
CHOLANGIOGRAPHY
ANALYSIS, 6472*
COMPLICATIONS, 6472*
NEOPLASMS
DIAGNOSIS, 6324*
PANCREAS
ABSCESS, 6330
NEOPLASMS, 6328
PANCREAS FUNCTION TESTS
DIAGNOSIS, 6324*
PANCREATIC DISEASES
CHOLANGIOGRAPHY, 6092
DIAGNOSIS, 6324*
PANCREATIC DUCT
ANALYSIS, 6472*
COMPLICATIONS, 6472*

PARASITES AND PARASITIC DISEASES
AGE FACTORS, 6552
ANTHELMINTICS, 5997
EPIDEMIOLOGY, 6550
ILEITIS
EOSINOPHILS, 6223*
IMMUNOGLOBULINS, 6551

PARASITES AND PARASITIC DISEASES (continued)
SERODIAGNOSIS
ENZYMES, 6549
SEX FACTORS, 6552

PARASYMPATHOLYTICS
IRRITABLE COLON
ELECTROPHYSIOLOGY, 6263*
MOTILITY, 6263*
MENETRIER'S DISEASE
PROTEINS, 6138*
PANCREATITIS
DRUG THERAPY, 6334*
GLUCAGON, 6334*
STOMACH
ANESTHESIA, 6512
PROTEINS, 6138*

PARATYPHOID FEVERS
SEE SALMONELLOSIS

PARENTERAL ALIMENTATION
GASTRECTOMY
THERAPY, 6176
GASTROINTESTINAL DISEASES
INFANT, 6535
INFANT
COMPLICATIONS, 6535
DIET, 6535
TECHNIQUES, 6535
LIVER INJURY, 6411
METABOLISM
HORMONE CONTROL, 6043*

PEPSINOGEN
ANEMIA
DIAGNOSIS, 6154

PEPTIC ULCER
SEE ULCER, PEPTIC

PERFORATION
ESOPHAGUS
DIAGNOSIS, 6101
REVIEW, 6101
SURGERY, 6101
GALLBLADDER
ULTRASOUND, 6001

PERFUSION
LIVER
GALACTOSE, 5976

PERITONEUM
ANOMALY, CONGENITAL
RADIOLOGY, 6539
MECKEL'S DIVERTICULUM
RADIOLOGY, 6539
RADIOLOGY
DIAGNOSIS, 6539
TECHNIQUES, 6539

PESTICIDES
LIVER
TOXICITY, 5960*
LIVER INJURY, 5960*

PHENOBARBITAL
BILE
DRUG METABOLISM, 5968*
TRANSPORT, 5968*
CHOLELITHIASIS
DRUG THERAPY, 6482*
CHOLESTASIS
BILE ACIDS AND SALTS, 6378

PHOSPHATASE, ALKALINE
SEE ALKALINE PHOSPHATASE

PHOSPHATE
ILEUM
VITAMIN D, 6030
INTESTINE, SMALL
VITAMIN D, 6030

PHOSPHATIDES
SEE PHOSPHOLIPIDS

PHOSPHOLIPIDS
DUODENUM, 6012*

PIGMENTS
CALCULI
CHEMICAL COMPOSITION, 6481*

PLASMA
LIVER DISEASES
LIPOPROTEINS, 6354*
LIVER FUNCTION TESTS
AMINO ACIDS, 6405
UREMIA
LIPOPROTEINS, 6354*

PLATELETS
SEE BLOOD PLATELETS

POLYPS
DUODENUM
SURGERY, 6121
ESOPHAGUS
SURGERY, 6121
JEJUNUM
SURGERY, 6121
STOMACH
CYSTS, 6151
CYTOLOGY, 6172
ENDOSCOPY, 6151
MORPHOLOGY, 6196
SURGERY, 6121
SURGERY
TECHNIQUES, 6121

PORPHYRIA
HEME
BILE, 6384
BILIRUBIN, 6384
EXCRETION, 6384
PORPHYRINS, 6384

PORPHYRINS
PORPHYRIA
HEME, 6384

PORTACAVAL SHUNT
BILE ACIDS AND SALTS
SECRETION, 5984
CHOLESTEROL
SECRETION, 5984

PORTAL HYPERTENSION
SEE HYPERTENSION, PORTAL

PRECANCEROUS CONDITIONS
COLON
COLITIS, ULCERATIVE, 6323
ESOPHAGUS
BARRETT'S SYNDROME, 6098
GASTROINTESTINAL SYSTEM
INTEGUMENTARY SYSTEM, 6540
STOMACH
CYTOLOGY, 6172

PREGNANCY
BILE
CHEMICAL COMPOSITION, 6476*
CHROMATOGRAPHY, 6476*
BILE ACIDS AND SALTS
CHROMATOGRAPHY, 6476*
METABOLISM, 6476*
GALLBLADDER
BILE, 6476*
BILE ACIDS AND SALTS, 6476*
HEPATITIS, INFECTIOUS
CLOTTING, 6439
FIBRINOLYSIS, 6439
JAUNDICE
CHOLESTASIS, 6367*
FATTY LIVER, 6367*
HEPATITIS, INFECTIOUS, 6367*
HORMONES, 6367*
INFANT, 6367*
PREMATURITY, 6367*
RECTUM
NEOPLASMS, MALIGNANT, 6294

PREMATURITY
ESOPHAGUS
FISTULA, 6106
JAUNDICE
PREGNANCY, 6367*

PROCTITIS
CLASSIFICATION, 6300
EPIDEMIOLOGY, 6321
SURGERY
TECHNIQUES, 6300

PROCTOCOLITIS
DISEASES ASSOCIATED WITH, 6301

PROLACTIN
LIVER
ANDROGENS, 6005
BINDING, 6005

PROSTAGLANDINS
DIARRHEA
INFANT, 6528
INTESTINES
PSEUDO-OBSTRUCTION, 6244
STOMACH
WOUNDS AND INJURIES, 6195

PROSTHESIS
BILE DUCTS
STENOSIS, 5958*
WOUNDS AND INJURIES, 5958*

PROSTHESIS (continued)
BILIARY TRACT
SURGERY, 5958*
COMMON BILE DUCT
SURGERY, 5958*

PROTEIN-LOSING ENTEROPATHIES
CHILD
AMINO ACIDS, 6531, 6532
PROTEINS, 6532
DIARRHEA
CHILD, 6531
DIET
THERAPY, 6531
DRUGS
PROTEINS, 6522
INFANT
AMINO ACIDS, 6532
PROTEINS, 6532
LIVER CIRRHOSIS
OXIDOREDUCTASES, 6544
MALABSORPTION SYNDROMES
CHILD, 6531
OXIDOREDUCTASES
ENZYMES, 6544
PATHOLOGY, 6544
PROTEINS
METABOLISM, 6515
SYNTHESIS, 6515
SALIVA
AMINO ACIDS, 6532
PROTEINS, 6532

PROTEINS
DIARRHEA
MILK, 6251*
FATTY ACIDS
DRUG-INDUCED, 5975
GASTRITIS
DIGESTION, 6209
INFLAMMATORY BOWEL DISEASES
SERUM, 6313*
KWASHIORKOR
DRUGS, 6522
LIVER
FATTY ACIDS, 5975
SYNTHESIS, 5957*
MENETRIER'S DISEASE
PARASYMPATHOLYTICS, 6138*
NUTRITION DISORDERS
CHILD, 6532
INFANT, 6532
SALIVA, 6532
PARASYMPATHOLYTICS
STOMACH, 6138*
PROTEIN-LOSING ENTEROPATHIES
CHILD, 6532
DRUGS, 6522
INFANT, 6532
METABOLISM, 6515
SALIVA, 6532
SYNTHESIS, 6515
SERUM
FATTY LIVER, 6406
HEPATITIS, 6406
LIVER CIRRHOSIS, 6406
LIVER DISEASES, 6406
SYNTHESIS
CIRCADIAN RHYTHM, 5957*

PROTEINS (continued)
ULCER, PEPTIC
DIGESTION, 6209

PROTHROMBIN
INTESTINES
ANASTOMOSIS, 6049
LIVER INJURY
HEMORRHAGE, 6421*

PROTOZOAL DISEASES
COLITIS
SURGERY, 6555
INTESTINES
EPIDEMIOLOGY, 6554

PSEUDO-OBSTRUCTION
INTESTINES
PROSTAGLANDINS, 6244

PSEUDOCYSTS
PANCREAS
ASCITES, 6331
PRESSURE STUDY
MANOMETRY, 6349
RUPTURE
MANOMETRY, 6349
PRESSURE STUDY, 6349

PYLORUS
STENOSIS
CHILD, 6175
SURGERY, 6175
SURGERY
DIARRHEA, 6153
DUMPING SYNDROME, 6153

RADIATION
GASTROINTESTINAL SYSTEM
REVIEW, 6521
WOUNDS AND INJURIES, 6521

RADIOIMMUNOASSAY
DIARRHEA
HORMONES, GASTROINTESTINAL, 6505*
GASTRIN
ANTIBODIES, 6078
HEPATITIS, CHRONIC
ANTIGENS, 5995
HEPATITIS, INFECTIOUS
ANTIGENS, 5995
SECRETIN
TECHNIQUES, 6033

RADIOISOTOPES
GASTRECTOMY
COMPLICATIONS, 6134*
HEMORRHAGE
DIAGNOSIS, 6089
TECHNIQUES, 6089
ZOLLINGER-ELLISON SYNDROME
DIAGNOSIS, 6134*

RADIOLOGY
ABDOMEN
HERNIA, 6229
ANOMALY, CONGENITAL
PERITONEUM, 6539

RADIOLOGY (continued)
BILE DUCTS
CONTRAST MEDIA, 6094
CHOLELITHIASIS
DYSPEPSIA, 6480*
COLITIS, ULCERATIVE
NEOPLASMS, MALIGNANT, 6318*
SURVIVAL, 6318*
COLON
NEOPLASMS, 6261*
COLONIC DISEASES
DIAGNOSIS, 6264, 6265
CROHN'S DISEASE
ADOLESCENCE, 6557*
CHILD, 6557*
ILEUM, 6558*
DUODENUM
DIVERTICULUM, 6238
ULCER, PEPTIC, 6202*
GALLBLADDER
OBSTRUCTION, 6493
GASTROINTESTINAL SYSTEM
CONTRAST MEDIA, 6085
INFLAMMATORY BOWEL DISEASES
SEQUELAE, 6312*
MECKEL'S DIVERTICULUM
PERITONEUM, 6539
PANCREAS
ABSCESS, 6333*
PERITONEUM
DIAGNOSIS, 6539
TECHNIQUES, 6539
ZENKER'S DIVERTICULUM
ULCER, PEPTIC, 6107

RADIONUCLIDES
ABDOMEN
SCANNING, SCINTILLATION, 6072
BILIARY TRACT
ANALYSIS, 6076
COMPLICATIONS, 6076
SCANNING, SCINTILLATION, 6071
TECHNIQUES, 6071, 6075
TRACER STUDY, 6075
ESOPHAGITIS
MARKER STUDY, 6156
HIATAL HERNIA
MARKER STUDY, 6156
INTESTINAL ABSORPTION, 6046
INTESTINES
INFARCTION, 6059*
INTUSSUSCEPTION, 6059*
SCANNING, SCINTILLATION, 6059*
LIVER
ANALYSIS, 6076
COMPLICATIONS, 6076
SCANNING, SCINTILLATION, 6071
TECHNIQUES, 6071, 6075
TRACER STUDY, 6075
LIVER DISEASES
KINETICS, 6465*
MECKEL'S DIVERTICULUM
MARKER STUDY, 6156
SCANNING, SCINTILLATION
TECHNIQUES, 6072
STOMACH
SECRETION, 6156

RADIOTHERAPY
COLON
NEOPLASMS, 6258*
GASTROINTESTINAL SYSTEM
RADIATION EFFECTS ON, 6521
RECTUM
NEOPLASMS, 6258*

RECTUM
SEE ALSO ANORECTUM, INTESTINE, LARGE
ANOMALY
DIAGNOSIS, 6307
BIOPSY
TECHNIQUES, 6285
DRAINAGE
INCONTINENCE, 6270
NEOPLASMS
BIOPSY, 6285
DIAGNOSIS, 6074
PATHOLOGY, 6260*
RADIOTHERAPY, 6258*
RECURRENCE, 6257*, 6285
REVIEW, 6258*
SIGMOIDOSCOPY, 6074
SURGERY, 6258*, 6260*
THERAPY, 6257*, 6258*
NEOPLASMS, MALIGNANT
COMPLICATIONS, 6290
CYTOLOGY, 6286
DIAGNOSIS, 6286
PREGNANCY, 6294
SURGERY, 6289, 6290
THERAPY, 6289, 6291
SURGERY
COMPLICATIONS, 6269, 6270
DRAINAGE, 6270
INCONTINENCE, 6270
VILLI
NEOPLASMS, 6260*

REFLUX
DUODENUM
DISTENTION, 6236
ESOPHAGITIS
SURGERY, 6113
GASTRITIS
CHOLESTYRAMINE, 6188
DRUG THERAPY, 6188
ODDI'S SPHINCTER
DUODENUM, 6236

REGIONAL ENTERITIS
SEE ENTERITIS, REGIONAL

RENIN
LIVER COMA
HORMONES, 6380

RESPIRATORY SYSTEM
ESOPHAGEAL REFLUX
DISEASES ASSOCIATED WITH, 6117
ESOPHAGUS
ATRESIA, 6105
LIVER COMA
COMPLICATIONS, 6363*
LIVER DISEASES
COMPLICATIONS, 6363*

RESPIRATORY SYSTEM (continued)
PANCREATITIS
COMPLICATIONS, 6346

REYE'S SYNDROME
HEPATITIS
DISEASES ASSOCIATED WITH, 6387

RUPTURE
ESOPHAGUS
DIVERTICULUM, 6133
PSEUDOCYSTS
MANOMETRY, 6349
PRESSURE STUDY, 6349

SALIVA
COLITIS, ULCERATIVE
IMMUNOGLOBULINS, 6319
CROHN'S DISEASE
IMMUNOGLOBULINS, 6319
INFLAMMATORY BOWEL DISEASES
IMMUNOGLOBULINS, 6319
NUTRITION DISORDERS
AMINO ACIDS, 6532
PROTEINS, 6532
PROTEIN-LOSING ENTEROPATHIES
AMINO ACIDS, 6532
PROTEINS, 6532

SALIVARY GLANDS
CYSTS, 6051
INFLAMMATION
SURGERY, 6545

SALMONELLOSIS
CARRIER STATE
SIMULATION, 6048

SCANNING, SCINTILLATION
ABDOMEN
ABSCESS, 6072
COMPLICATIONS, 6072
GALLIUM, 6072
RADIONUCLIDES, 6072
BILIARY TRACT
RADIONUCLIDES, 6071
CHOLECYSTITIS
DIAGNOSIS, 6064*
INTESTINES
INFARCTION, 6059*
INTUSSUSCEPTION, 6059*
RADIONUCLIDES, 6059*
JAUNDICE, OBSTRUCTIVE
DIAGNOSIS, 6474*
LIVER
ABSCESS, 6391
RADIONUCLIDES, 6071
TECHNIQUES, 6071
RADIONUCLIDES
TECHNIQUES, 6072

SCHISTOSOMIASIS
DIAGNOSIS
SERUM, 6060*
TECHNIQUES, 6060*
GRANULOMA
SIMULATION, 5972*
LIVER
ARTERIES, 6553
HYPERTENSION, PORTAL, 6553

SCHISTOSOMIASIS (continued)
LIVER DISEASES
CHLORIDES, 5972*

SCLERODERMA
LIVER CIRRHOSIS, OBSTRUCTIVE
COMPLICATIONS, 6464*

SECRETIN
BILE ACIDS AND SALTS
CLEARANCE STUDY, 5986
BILIARY TRACT
BILE ACIDS AND SALTS, 5986
CARBOHYDRATES, 5986
CARBOHYDRATES
CLEARANCE STUDY, 5986
INTESTINE, SMALL
ACIDS, 6026
PANCREAS
SECRETION, 6026
PANCREAS FUNCTION TESTS
DIAGNOSIS, 6324*
PANCREATITIS, CHRONIC, 6324*
RADIOIMMUNOASSAY
TECHNIQUES, 6033
SECRETION, 6027
DIETARY FACTORS, 6019*
FATS, 6019*

SECRETION
SEE ALSO ACID SECRETION, BICARBONATE SECRETION
BILE
ALBUMINS, 5982
INTESTINE, SMALL, 5996
BILE ACIDS AND SALTS
CHOLELITHIASIS, 6475*
LIVER DISEASES, 6475*
BILE DUCTS
BILE, 5980
BILE ACIDS AND SALTS, 5980
BILIARY TRACT DISEASES
BILE, 6080
CECUM
ELECTROLYTES, 6021
WATER, 6021
COMMON BILE DUCT
BILE, 6080
GASTROINTESTINAL DISEASES
MUCUS, 6524, 6525
INTESTINAL OBSTRUCTION
ETIOLOGY, 6016*
INTESTINE, SMALL
CHOLERA, 6017*
INTRINSIC FACTOR
DRUG EFFECTS ON, 6204*
H2 RECEPTOR ANTAGONISTS, 6204*
MUCUS
THERAPY, 6525
PANCREAS
INTESTINE, SMALL, 5996
SECRETIN, 6027
PORTACAVAL SHUNT
BILE ACIDS AND SALTS, 5984
CHOLESTEROL, 5984
SECRETIN, 6027
DIETARY FACTORS, 6019*
FATS, 6019*

SECRETION (continued)
STOMACH
GASTRIN, 6178
HORMONE CONTROL, 6178
ILEUM, 6022
INTESTINE, SMALL, 6022, 6178
JEJUNUM, 6022
RADIONUCLIDES, 6156
TRIGLYCERIDES
VITAMIN A, 5970*

SEPSIS
HEPATITIS, CHRONIC
COMPLICATIONS, 6444*
INTESTINE, LARGE
SURGERY, 6271
LIVER CIRRHOSIS
COMPLICATIONS, 6444*

SERODIAGNOSIS
PARASITES AND PARASITIC DISEASES
ENZYMES, 6549

SERUM
ALBUMINS
FATTY LIVER, 6406
HEPATITIS, 6406
LIVER CIRRHOSIS, 6406
LIVER DISEASES, 6406
BILE ACIDS AND SALTS
CHOLELITHIASIS, 6475*
LIVER DISEASES, 6475*
GASTRIN, 6191
ACHLORHYDRIA, 6181
ARTHRITIS, 6192
HYPERLIPOPROTEINEMIA
LIPIDS, 6365*
IMMUNOGLOBULINS
FATTY LIVER, 6406
HEPATITIS, 6406
LIVER CIRRHOSIS, 6406
LIVER DISEASES, 6406
INFLAMMATORY BOWEL DISEASES
IMMUNOGLOBULINS, 6313*
LYSOZYMES, 6313*
PROTEINS, 6313*
LIPIDS
CHENODEOXYCHOLIC ACID, 5963*
LIVER DISEASES
ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6410
BILE ACIDS AND SALTS, 6403
PANCREATIC DISEASES
ADENOSINE CYCLIC 3',5' MONOPHOSPHATE, 6410
PANCREATITIS
TRIGLYCERIDES, 6346
PROTEINS
FATTY LIVER, 6406
HEPATITIS, 6406
LIVER CIRRHOSIS, 6406
LIVER DISEASES, 6406
SCHISTOSOMIASIS
DIAGNOSIS, 6060*

SHIGELLOSIS
INFANT
ANTIBIOTICS, 6542

SHUNT
BUDD-CHIARI SYNDROME
LIVER DISEASES, ALCOHOLIC, 6357*
TECHNIQUES, 6357*
THERAPY, 6357*

SHUNT, INTESTINAL
COMPLICATIONS
ENTERITIS, 6225*
ENTERITIS
PREVENTION, 6225*
SURGERY, 6225*
THERAPY, 6225*
INTESTINAL ABSORPTION
FATS, 6224*
JEJUNUM
BIOCHEMISTRY, 6240
MORPHOLOGY, 6240
OBESITY, 6240
OBESITY
BIOCHEMISTRY, 6240
BODY COMPOSITION, 6224*
FATS, 6224*
INTESTINAL ABSORPTION, 6224*
INTESTINE, SMALL, 6224*
MORPHOLOGY, 6240
REVIEW, 6230

SIGMOID
SEE ALSO COLON
CIRCULATION, 6052
NEOPLASMS
DIAGNOSIS, 6074
SIGMOIDOSCOPY, 6074
NEOPLASMS, MALIGNANT
THERAPY, 6291

SIGMOIDOSCOPY
COLON
NEOPLASMS, 6074
RECTUM
NEOPLASMS, 6074
SIGMOID
NEOPLASMS, 6074

SMALL INTESTINE
SEE INTESTINE, SMALL

SMOKING
CARCINOEMBRYONIC ANTIGEN
NEOPLASMS, 6077
NEOPLASMS, MALIGNANT, 6077

SODIUM
LIVER COMA
HORMONES, 6380
LIVER DISEASES
TRANSPORT, 6377

SPHINCTER
ESOPHAGUS
ACHALASIA, 6118
DRUG EFFECTS ON, 6125
ENDOSCOPY, 6122
FOOD, 6125
HIATAL HERNIA, 6125
HORMONE EFFECTS ON, 6125
HYPERTENSION, 6126
THYROCALCITONIN, 6118

SPRUE
COLON
ULCER, 6252

STEATOSIS
SEE FATTY LIVER

STENOSIS
BILE DUCTS
DIAGNOSIS, 6483*
PROSTHESIS, 5958*
SURGERY, 6483*
ILEUM, 6227
ODDI'S SPHINCTER
BILE DUCTS, 6483*
DIAGNOSIS, 6483*
SURGERY, 6483*
PYLORUS
CHILD, 6175
SURGERY, 6175
STOMACH
ULCER, 6167
ULCER
CIRCULATION, 6167
ULCER, PEPTIC
CIRCULATION, 6167

STEROIDS
DIARRHEA
BACTERIA, 6504*
ETIOLOGY, 6504*
FECES, 6504*
GEOGRAPHICAL FACTORS, 6504*
FATTY LIVER
DRUG-INDUCED, 6453*
LIVER
ENDOTOXINS, 5994
NEOPLASMS, MALIGNANT, 6360*
UREA
ENZYMES, 6448*
METABOLISM, 6448*

STEROLS
ILEUM
VITAMIN D, 6030
INTESTINE, SMALL
VITAMIN D, 6030

STOMACH
ACID SECRETION
DRUG EFFECTS ON, 6204*
H2 RECEPTOR ANTAGONISTS, 6204*
HEMODIALYSIS, 6140*
ULCER, PEPTIC, 6201*
VAGOTOMY, 6150
ANTACIDS
ANESTHESIA, 6512
BARIUM
TECHNIQUES, 6056*
BLEEDING
DISEASES ASSOCIATED WITH, 6197
LASER, 6045*
THERAPY, 6045*
BURNS, CHEMICAL
CIRCULATION, 6166
MORPHOLOGY, 6166
VEINS, 6166
CHILD
ENDOSCOPY, 6543

STOMACH (continued)
CIRCULATION
ACID SECRETION, 6199*
CLEARANCE STUDY, 6199*
CYSTS
ENDOSCOPY, 6151
POLYPS, 6151
EMPHYSEMA
ENDOSCOPY, 6058*
ENDOSCOPY
TECHNIQUES, 6182
ENZYMES
GASTRITIS, ATROPHIC, 6189
ESOPHAGEAL REFLUX
CHILD, 6116
ESOPHAGITIS, 6120
HIATAL HERNIA, 6120
SURGERY, 6115
ESOPHAGUS
BLEEDING, 6127
OBSTRUCTION, 6131
FISTULA
DRUG THERAPY, 6187
HEALING, 6187
GALLBLADDER
ANOMALY, 6497
GASTRIN
ACHLORHYDRIA, 6181
GASTRITIS
CYTOLOGY, 6172
HEMORRHAGE
ALCOHOLS, 6102
ASPIRIN, 6102
EMBOLIZATION, 6168
ENDOSCOPY, 6057*
ULCER, PEPTIC, 6102
INFANT
ENDOSCOPY, 6543
INFLAMMATION
DISEASES ASSOCIATED WITH, 6197
INTRINSIC FACTOR
DRUG EFFECTS ON, 6204*
H2 RECEPTOR ANTAGONISTS, 6204*
MORPHOLOGY
BARIUM, 6056*
DRUG EFFECTS ON, 6179
GASTRITIS, ATROPHIC, 6189
MOTILITY
ANOMALY, 6194
ILEUM, 6022
INTESTINE, SMALL, 6022
JEJUNUM, 6022
NEOPLASM METASTASIS
RECURRENCE, 6164
SURGERY, 6164
NEOPLASMS
AGE FACTORS, 6162
CYTOLOGY, 6172
DIAGNOSIS, 6172, 6174
GASTRECTOMY, 6146, 6147
HISTOLOGY, 6221*
PROGNOSIS, 6146
RECURRENCE, 6164
REVIEW, 6221*
SURGERY, 6145, 6161, 6162, 6163, 6164, 6171
SURVIVAL, 6145, 6171
TECHNIQUES, 6163

STOMACH (continued)
NEOPLASMS, BENIGN
DIAGNOSIS, 6170
SURGERY, 6170
NEOPLASMS, MALIGNANT
ACHALASIA, 6186
BIOPSY, 6182
COMPLICATIONS, 6160
CYTOLOGY, 6135*, 6182
DIAGNOSIS, 6135*, 6148, 6149, 6158, 6159, 6165, 6182, 6183
DIETARY FACTORS, 6184
ENDOSCOPY, 6135*, 6165, 6182
MANOMETRY, 6186
PROGNOSIS, 6149
REVIEW, 6135*
SURGERY, 6159, 6160
SURVIVAL, 6160
THERAPY, 6148, 6149
ULTRASTRUCTURE, 6185
PARASYMPATHOLYTICS
ANESTHESIA, 6512
PROTEINS, 6138*
PERMEABILITY
HEMODIALYSIS, 6140*
PHYSIOLOGY
MARKER STUDY, 6156
POLYPS
CYTOLOGY, 6172
ENDOSCOPY, 6151
MORPHOLOGY, 6196
SURGERY, 6121
PRECANCEROUS CONDITIONS
CYTOLOGY, 6172
SECRETION
GASTRIN, 6178
HORMONE CONTROL, 6178
ILEUM, 6022
INTESTINE, SMALL, 6022, 6178
JEJUNUM, 6022
RADIONUCLIDES, 6156
ULCER
CHILD, 6207
CYTOLOGY, 6172
DRUG THERAPY, 6198
DRUGS, 6142*
H2 RECEPTOR ANTAGONISTS, 6157
HEMORRHAGE, 6108
MORPHOLOGY, 6196
PREVENTION, 6198
STENOSIS, 6167
ULCER, PEPTIC
ANTACIDS, 6144*
BIOPSY, 6205
DIAGNOSIS, 6205
DIGESTION, 6209
DRUG THERAPY, 6143*, 6144*
ENDOSCOPY, 6205
GASTRIN, 6193
H2 RECEPTOR ANTAGONISTS, 6143*, 6144*
VILLI
NEOPLASMS, MALIGNANT, 6159
WOUNDS AND INJURIES
DRUG THERAPY, 6195
H2 RECEPTOR ANTAGONISTS, 6195
PROSTAGLANDINS, 6195

STOMACH DISEASES
CONNECTIVE TISSUE
ANTIBODIES, 6499*
DRUG THERAPY
H2 RECEPTOR ANTAGONISTS, 6212

STRANGULATION
APPENDIX, 6275

STRESS
PANCREATITIS
BIOCHEMISTRY, 6337*
ENDOCRINE SYSTEM, 6337*

STRICTURE
BILE DUCTS
CHOLANGIOJEJUNOSTOMY, 6356*
ESOPHAGUS
DILATATION, 6124, 6130
ENDOSCOPY, 6130
GASTRECTOMY, 6147
THERAPY, 6124

SUGAR
SEE CARBOHYDRATES

SULFOBROMOPHTHALEIN
BILE
CLEARANCE STUDY, 5968*
URINE
CLEARANCE STUDY, 6053

THALASSEMIA
HEPATITIS, INFECTIOUS
EPIDEMIOLOGY, 6426*
TRANSFUSION, 6426*
TRANSMISSION, 6426*

THYROCALCITONIN
ESOPHAGUS
ACHALASIA, 6118
SPHINCTER, 6118

TOXICITY
LACTOSE INTOLERANCE
INFANT, 6253
LIVER
PESTICIDES, 5960*

TOXINS
CELIAC DISEASE
CHEMICAL COMPOSITION, 6249*
COLITIS
CLOSTRIDIUM, 6259*

TRANSAMINASE
SEE AMINO TRANSFERASES

TRANSFUSION
AUSTRALIA ANTIGEN
TRANSMISSION, 6436
HEPATITIS, INFECTIOUS
AUSTRALIA ANTIGEN, 6434*, 6436
BLOOD PLATELETS, 6429*
THALASSEMIA, 6426*
TRANSMISSION, 6436
LIVER INJURY
METABOLISM, 5993
SURVIVAL, 5993

TRANSPORT
BILE
PHENOBARBITAL, 5968*
HEPATOCYTES
DRUGS, 5977
LIVER
BILE ACIDS AND SALTS, 5979
CELLS, 5979
DRUGS, 5977
GASTRIN, 5956*
WATER, 5979
LIVER DISEASES
SODIUM, 6377
VITAMIN A
LIVER CIRRHOSIS, 6451*

TRAUMA
SEE STRESS, WOUNDS AND INJURIES

TRIGLYCERIDES
SEE ALSO FATS, LIPIDS
JAUNDICE, OBSTRUCTIVE
LIPOPROTEINS, 6381
PANCREATITIS
DIAGNOSIS, 6346
SERUM, 6346
SECRETION
VITAMIN A, 5970*

TRYPSIN
HEPATOCYTES
WOUNDS AND INJURIES, 6000
LIVER INJURY
PREVENTION, 6000

TUBERCULOSIS
DRUG THERAPY
COMPLICATIONS, 6419*
GASTRITIS
DRUG THERAPY, 6177
ULCER, PEPTIC
DRUG THERAPY, 6177

TYPHOID
SEE SALMONELLOSIS

ULCER
ABSORPTION
DRUGS, 6142*
CELIAC DISEASE
COLON, 6252
DRUGS
HEALING, 6142*
HEMORRHAGE
H2 RECEPTOR ANTAGONISTS, 6108
SPRUE
COLON, 6252
STENOSIS
CIRCULATION, 6167
STOMACH
CHILD, 6207
CYTOLOGY, 6172
DRUG THERAPY, 6198
DRUGS, 6142*
H2 RECEPTOR ANTAGONISTS, 6157
HEMORRHAGE, 6108
MORPHOLOGY, 6196
PREVENTION, 6198
STENOSIS, 6167

ULCER, PEPTIC
ABSORPTION
DRUGS, 6142*
CIRCULATION
ACID SECRETION, 6199*
DIAGNOSIS
BIOPSY, 6205
ENDOSCOPY, 6205
DIGESTION
PROTEINS, 6209
DRUG THERAPY, 6211, 6216
ANTACIDS, 6144*
H2 RECEPTOR ANTAGONISTS, 6143*, 6144*, 6203*, 6212, 6213, 6214, 6215
DRUGS
HEALING, 6142*
DUODENUM
DIAGNOSIS, 6202*
DISEASES ASSOCIATED WITH, 6241
DRUG THERAPY, 6202*, 6203*, 6214, 6215
DUODENITIS, 6241
H2 RECEPTOR ANTAGONISTS, 6203*, 6214, 6215
HEALING, 6215
HEMORRHAGE, 6102
RADIOLOGY, 6202*
REVIEW, 6202*
SURGERY, 6202*
EPIDEMIOLOGY, 6206
ESOPHAGUS
HEMORRHAGE, 6102
GENETIC FACTORS, 6208
HEALING
DISEASES ASSOCIATED WITH, 6241
DUODENITIS, 6241
ENDOSCOPY, 6215
HEMORRHAGE
H2 RECEPTOR ANTAGONISTS, 6108
PREVENTION, 6210
RISK FACTORS, 6208
STENOSIS
CIRCULATION, 6167
STOMACH
ACID SECRETION, 6201*
ANTACIDS, 6144*
BIOPSY, 6205
DIAGNOSIS, 6205
DIGESTION, 6209
DRUG THERAPY, 6143*, 6144*
ENDOSCOPY, 6205
GASTRIN, 6193
H2 RECEPTOR ANTAGONISTS, 6143*, 6144*
HEMORRHAGE, 6102
THERAPY, 6210
MILK, 6217
TUBERCULOSIS
DRUG THERAPY, 6177
VITAMINS, 6218
ZENKER'S DIVERTICULUM
PATHOLOGY, 6107
RADIOLOGY, 6107

ULCERATIVE COLITIS
SEE COLITIS, ULCERATIVE

ULTRASONOGRAPHY
ABDOMEN
ANOMALY, 6533
CYSTS, 6533
ANOMALY
DIAGNOSIS, 6533
BILIARY TRACT
OBSTRUCTION, 6489
COMMON BILE DUCT
TECHNIQUES, 6066*
CYSTS
DIAGNOSIS, 6533
GALLBLADDER
ANOMALY, 6495
JAUNDICE, OBSTRUCTIVE
GALLBLADDER, 6485

ULTRASOUND
BILIARY TRACT
DIAGNOSIS, 6083
CHOLANGIOGRAPHY
DIAGNOSIS, 6083
CHOLELITHIASIS
OBSTRUCTION, 6065*
REVIEW, 6065*
GALLBLADDER
BILE, 6001
PERFORATION, 6001
GALLBLADDER DISEASES
DIAGNOSIS, 6082
INTESTINES
CIRCULATION, 6006*
ISCHEMIA, 6006*
PANCREAS
ABSCESS, 6333*

UREA
ENZYMES
DRUG EFFECTS ON, 6448*
STEROIDS, 6448*
HEPATITIS
ENZYMES, 6448*
METABOLISM, 6448*
HEPATITIS, CHRONIC
ENZYMES, 6448*
METABOLISM, 6448*
LIVER DISEASES
ENZYMES, 6448*
METABOLISM, 6448*
LIVER DISEASES, ALCOHOLIC
ENZYMES, 6448*
METABOLISM, 6448*
METABOLISM
DRUG EFFECTS ON, 6448*
STEROIDS, 6448*

UREMIA
HEMOLYSIS
DISEASES ASSOCIATED WITH, 6514
KIDNEYS
LIPIDS, 6354*
MORPHOLOGY, 6354*
PLASMA
LIPOPROTEINS, 6354*

URINARY SYSTEM
DISEASE
LIVER, 6541

URINARY SYSTEM (continued)
LIVER CIRRHOSIS
COMPLICATIONS, 6463*
LYSOZYMES, 6463*
LIVER COMA
CIRCULATION, 5992
COMPLICATIONS, 6463*
LYSOZYMES, 6463*
SURGERY
ILEUM, 6227

URINE
GLUTATHIONE
CLEARANCE STUDY, 6053
HEPATITIS, CHRONIC
AMINES, 6413
LIVER CIRRHOSIS
AMINES, 6413
LIVER DISEASES
AMINES, 6413
PANCREAS FUNCTION TESTS
CYSTIC FIBROSIS, 6061*
SULFOBROMOPHTHALEIN
CLEARANCE STUDY, 6053

UROGENITAL SYSTEM
INFLAMMATORY BOWEL DISEASES
COMPLICATIONS, 6297

VAGOTOMY
COMPLICATIONS
ANESTHETICS, 6169
WATER, ELECTROLYTE BALANCE, 6169
DIARRHEA
SURGERY, 6153
DUMPING SYNDROME
SURGERY, 6153
STOMACH
ACID SECRETION, 6150

VARICES
COMMON BILE DUCT
SURGERY, 6494
ESOPHAGUS
ENDOSCOPY, 6104
THERAPY, 6104, 6458, 6467
HYPERTENSION, PORTAL
BLEEDING, 6468
ESOPHAGUS, 6468
SURGERY, 6468
THERAPY, 6467, 6468
LIVER DISEASES, ALCOHOLIC
LIVER CIRRHOSIS, 6458
THERAPY, 6458

VASOACTIVE INTESTINAL PEPTIDE
SEE HORMONES, GASTROINTESTINAL

VASOPRESSIN
MESENTERY
CIRCULATION, 6040*

VATER'S AMPULLA
BARIUM
DUODENOGRAPHY, 6237
NEOPLASMS
DUODENOGRAPHY, 6237

VEINS
LIVER
GASES, 6364*
STOMACH
BURNS, CHEMICAL, 6166

VILLI
COLON
NEOPLASMS, 6260*
INTESTINE, LARGE
NEOPLASMS, 6260*
OBESITY
HYPERTROPHY, 6224*
RECTUM
NEOPLASMS, 6260*
STOMACH
NEOPLASMS, MALIGNANT, 6159

VIRUS DISEASES
GASTROENTERITIS
EPIDEMIOLOGY, 6529
INFANT, 6529
PATHOLOGY, 6529

VIRUSES
GASTROENTERITIS
CHILD, 6517
FECES, 6517
GASTROINTESTINAL DISEASES
ACIDITY, 6047
NEONATE, 6047
PREVENTION, 6047
PROTEOLYSIS, 6047
SIMULATION, 6047
HEPATITIS, CHRONIC
ETIOLOGY, 6425*
HEPATITIS, INFECTIOUS
ETIOLOGY, 6425*
INFLAMMATORY BOWEL DISEASES, 6320

VITAMIN A
FATTY LIVER, 5970*
LIPIDS
METABOLISM, 5970*
LIVER
LIPIDS, 5970*
LIVER CIRRHOSIS
THERAPY, 6451*
METABOLISM
LIVER CIRRHOSIS, 6451*
SECRETION
TRIGLYCERIDES, 5970*
TRANSPORT
LIVER CIRRHOSIS, 6451*

VITAMIN D
DUODENUM
ABSORPTION, 6039
ILEUM
PHOSPHATE, 6030
STEROLS, 6030
INTESTINE, SMALL
PHOSPHATE, 6030
STEROLS, 6030
METABOLISM
ENTERECTOMY, 6561*
LIVER CIRRHOSIS, 6452*
LIVER DISEASES, ALCOHOLIC, 6452*

VITAMINS
ULCER, PEPTIC, 6218

VOLVULUS
SEE INTESTINAL OBSTRUCTION

WATER
CECUM
SECRETION, 6021
LIVER
TRANSPORT, 5979

WATER, ELECTROLYTE BALANCE
VAGOTOMY
COMPLICATIONS, 6169

WHIPPLE'S DISEASE
SEE LIPODYSTROPHY, INTESTINAL

WILSON'S DISEASE
COPPER
CERULOPLASMIN, 6465*
KINETICS, 6465*
HEPATITIS, CHRONIC
DIAGNOSIS, 6370*
DRUG THERAPY, 6370*
PROGNOSIS, 6370*
SIMULATION, 6370*

WOUNDS AND INJURIES
BILE DUCTS
IATROGENESIS, 6492
PROSTHESIS, 5958*
GASTROINTESTINAL SYSTEM
RADIATION, 6521
HEPATOCYTES
TRYPSIN, 6000
STOMACH
DRUG THERAPY, 6195
H2 RECEPTOR ANTAGONISTS, 6195
PROSTAGLANDINS, 6195

ZENKER'S DIVERTICULUM
ULCER, PEPTIC
PATHOLOGY, 6107
RADIOLOGY, 6107

ZINC
CROHN'S DISEASE
DEFICIENCY, 6563*

ZOLLINGER-ELLISON SYNDROME
COMPLICATIONS
DIAGNOSIS, 6134*
DIAGNOSIS
RADIOISOTOPES, 6134*
DISEASES ASSOCIATED WITH
ENDOCRINE DISEASES, 6509*
FAMILIAL FACTORS, 6509*
GASTRECTOMY
COMPLICATIONS, 6134*

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